



ORIGINAL RESEARCH PAPER

Commerce

DYNAMICS OF TECHNICAL EDUCATION IN ANDHRA PRADESH

KEY WORDS: Artificial Intelligence, Internet of Things, Block Chain, Robotics, Data Sciences, Cyber Security, 3D Printing and Design

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ABSTRACT

The technical education all over the world is gaining importance day by day due to rapid advancements in science and technology and innovations in various disciplines because of the constant and continues research in each and every field. In developing countries, especially in India, the knowledge of advancement in technology is one of the basic requirements for any development activities. The development of a nation does not depending on the available sources but on effective utilization of these resources. It need technocrats for the effective utilization of the available resources. Unless an effective technical education is provided to the youth of the nation, the process of development cannot be accelerated and therefore the engineering education has a significant role to play in the development of national productivity prosper and self sufficiency. In fact, the technical education transforms a human being into a human resource. It enables mankind to be a resource creator and thus the engineers are treated as the person, who applies his skills to create new things to make human life more comfortable. The technology has been always present in the world since the very existence of humanity on earth, when humans made inventions, such as the wedge, lever, wheel and pulley. The engineering education in India is one of the most preferred choices for students, who have scored high at the 10+2 level. In this paper, an attempt is made to outline the evolution of engineering education in India with special reference to Andhra Pradesh, its growth and development over the period and its present scenario.

INTRODUCTION:

The technical education plays a significant role and can be considered as backbone for the economic progress and development of any nation. Technology can be defined as application of scientific knowledge in the form of innovation, design, construction, operation and maintenance of structures, machines, materials, devices, systems, processes, and organizations. The discipline of engineering incorporates a broad range of more specialized fields of engineering, each with a more specific emphasis on particular areas of applied mathematics, applied science, and types of application. It has been always present in the world since the very existence of humanity on earth, when humans made inventions, such as the wedge, lever, wheel and pulley. Technical education in India has scaled over the last decade encouraging 1000s of engineering colleges spread across the length and breadth of the country and producing over half a million engineering graduates annually. Further, engineering course is one of the most preferred choices for students and parents at present. Thus, India is said to be the largest producer of engineers in the world.

But, in India there is unevenness in number of engineering colleges, which are especially in southern region (Karnataka, Tamil Nadu, Andhra Pradesh, Telangana and Kerala) as compared to the northwest and eastern regions of the country. The top 7 states in terms of highest number of technical institutes in India are Uttar Pradesh, Maharashtra, Karnataka, Rajasthan, Andhra Pradesh, Tamil Nadu and Gujarat, which have 28 and more colleges per every lakh population.

Evolution of Technical Education:

The evolution of technical education can be traced from Vedic period, medieval period, pre independence and post-independence era. The technical education during Vedic period (prior to 1000 BC) comprises ashrams of acharyas and kulagurus. The Vedas, languages, logic, philosophy, ethics, politics and economics were taught along with technological skills and science of warfare. Taxila is one of most famous institution of this period, in which numerous technical skills, such as carpentry, smithy, foundry and weaving were taught.

The students came from far-off places to study the various arts, sciences and medicine in this institution.

Later Buddhism prevailed in India and Buddhist developed university institution, such as Nalanda, Vikramasila, Ranchi, etc., and many vocational courses were also encouraged. Elegance and excellence of articles, such as, fine fabrics of cotton and silk, embroidery, painted and enameled wares, swords, knives, gold and silver jewellery are well known in India. Not only wide range of skills was imparted to the native students, but these universities attracted many foreign students also. But all these are gradually disintegrated with the decay of Buddhism in India.

Pre-Independence Period:

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 till India became Independent. After the battle of Plessey in 1754 the English traders established a survey school in Madras (Chennai) in 1794 to train Indian personnel in land survey to assist British Surveyors. The importance of civil engineering as a discipline of education for Indians started receiving emphasis in 1804s with road and canal projects as goals, lower grade technicians were trained for measuring and survey equipments needed for army, navy and other technical establishments for maintenance of colonies of the British Crown.

In 1842, James Thomson, the Lieutenant Governor of North Western Province, first of all proposed the establishment of college of Civil Engineering at Roorkee to train engineering personnel at various levels for public works of the country and named as Thomson College of Civil Engineering in 1854 and in 1940 it is renamed as the Roorkee Engineering College and the same one became the first Technical University of India. In 2003, it has given status as Indian Institute of Technology (IIT).

In pursuance of the Government policy, three Engineering Colleges were opened in 1856 in the three Presidencies of India by the British rulers. In **Bengal Presidency**, a college by

name the Calcutta College of Civil Engineering (which later became Indian Institute of Engineering Science and Technology, Shibpur) was housed at the Writers' Building in November 1856. In **Bombay Presidency**, the College of Engineering, Pune latter it was affiliated to the Bombay University in 1858. In the **Madras Presidency**, the College of Engineering, Guindy was later affiliated to the Madras University (1858). In **1911**, Sir Jamshed Tata established the Indian Institute of Science at Bangalore and became one of the premier institutes in India.

During the period **1921-1937**, a number of such institutions were set-up, e.g., The Indian School of Mines, Dhanbad; The Harcourt Technological Institute, Kanpur; and The School of Chemical Technology, Bombay. **By 1939**, at the outbreak of Second World War, there were not more than ten or eleven engineering colleges in India each with an annual intake of about 200 students. The Bengal Engineering College at Sibpur started Mechanical and Electrical Engineering Courses in 1935-36 and courses in metallurgy in 1939-40.

Further, during the period from 1944 to 1947 was a turning point of transition in the technical education. The Sarkar Committee in 1945 recommended the establishment of at least four Higher Technical Institutes one in each zone - north, south, east and west of India. In 1945 the All India Council for Technical Education (AICTE) was set-up by a resolution of the Government of India on the recommendations made by Central Advisory Board of Education (CABE). The University of Banaras started degree classes in mechanical engineering, electrical engineering and metallurgy (1917).

The Central Government identified the need for technically qualified persons in sufficient number for the growth of Industries by mid-20th Century. It started promoting the higher technical institutes in 1950 with the establishment of the first IIT at Kharagpur. The second IIT was established in 1958 in Bombay, the third one at Chennai in 1959, the fourth in Kanpur in 1960, the fifth in Delhi in 1961 and the sixth in Guwahati in 1995 and the seventh IIT was established in 2001 in Roorke by upgrading the NTT. The Central Government promised to establish the eighth IIT near Hyderabad in 2006. The first five institutes had the benefit of assistance and partnership from foreign countries i.e. IIT Kharagpur-UNESCO, IIT Bombay- USSR, IIT Chennai-Federal Republic of Germany, HT Kanpur-USA, HT Delhi-UK.

After independence, the Indian government in accordance to the Sarkar Committee recommendations established five Indian Institutes of Technology between 1950 and 1961 period. On the recommendations of the Engineering Personnel Committee (1955) the Regional Engineering Colleges were established from 1959 onwards in each of the major states. Each college was a joint and cooperative enterprise of the central government and the concerned state government. The first REC was started in Warangal in Andhra Pradesh in the year 1959, followed by six others in 1960; four more in 1961 and two in 1963 and one each in the years 1964, 1967, 1986 and 1988 making their strength seventeen. These institutions are converted as National Institutes of Technologies (NITs) and are fully funded institutes of the Central government from the year 2002. The Bihar Engineering College located at Patna has also been added to the family of NITs raising their strength to 18.

Since Independence, there was a phenomenal expansion of technical education in India at the Polytechnic Diploma level after the Independence of the country. The Government of India from time to time has taken keen interest in developing the community polytechnic, which aims at sustainable community development without environmental degradation by way of science and technology applications for socio-economic up-liftment and improvement in the quality of life of common man through micro level planning and people's

participation at the grass root level.

The National Education Policy (NEP) of 1986 addressed to the issues of engineering and technical education in the private sector in a different context. The 1980s saw a phenomenal growth of technical institutions in four states. There are more than 2,128 polytechnic colleges in India. Between the period 1990 and 2003, the number of engineering colleges rose from 337 to 1200 (of which almost 1000 are in the private sector). At present there are about 3,045 Engineering Colleges in India at UG level for the academic year 2016-17.

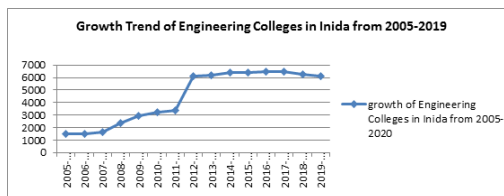
Graph-1: Growth of Technical Institutions in India from 2005 to 2020



Table-1: Growth of Technical Institutions and Colleges in India during 2005-2020

Year	No. of Technical Institutions in India	No. of Engineering & Technical Colleges in India at UG, PG & Diploma Level
2005-06	5756	1475
2006-07	6006	1511
2007-08	6423	1668
2008-09	8114	2388
2009-10	9565	2942
2010-11	8004	3241
2011-12	8361	3393
2012-13	8562	6099
2013-14	9767	6218
2014-15	9836	6385
2015-16	9892	6431
2016-17	9954	6474
2017-18	10013	6446
2018-19	10067	6276
2019-20	10558	6151

Graph-2: Trend of Engineering Colleges in India during 2005-2019



Growth and Development of Technical Education in Andhra Pradesh:

Before independence in the erstwhile Andhra Pradesh, which was a part of Madras presidency, the Osmania University (O.U.) College of engineering was established in Hyderabad in 1929 and it was the first engineering college of Andhra Pradesh. This was the sixth engineering college in British India. Later in 1943 Osmania University College of Technology was established.

In 1946 Andhra University College of Engineering has been sanctioned at Cocanada (the present Kakinada) under Madras state. In 1953, Telugu-speaking regions of the State split to form **Andhra State**. In 1955 after bifurcation of the State the campus was shifted to Visakhapatnam with introduction of major branches of engineering- mechanical, civil and electrical. In 1956 Kakatiya University (KU) College of

engineering established at Kothagudem. In 1958 SV College of Engineering is the seventh one established by Sri Venkateswara University in Tirupati. Later, Jawaharlal Nehru Technological University was established in 1972, by an Act of State Legislature. The Government Engineering Colleges at Ananthapur, Kakinada and Hyderabad, along with the Government College of Fine Arts and Architecture at Hyderabad, has become its Constituent Colleges. Subsequently, JNTU act 1972 was amended by JNTU (Amendment) Ordinance, 1992 to affiliate any other college or Institution notified by the A.P. State Government. Hence, JNT University is a multi-campus University with headquarters at Hyderabad.

As per the Act No. 30 and 31 of 2008 dated 24 September 2008, Jawaharlal Nehru Technological was divided into four universities, Jawaharlal Nehru Technological University Hyderabad (JNTUH), Jawaharlal Nehru Technological University Kakinada (JNTUK), Jawaharlal Nehru Technological University Ananthapur (JNTUA) and Jawaharlal Nehru Architecture and Fine Arts University, Hyderabad. Thus, the number of engineering colleges in Andhra Pradesh at the end of year 1976 was 10.

As a sea change for the first time, in the year 1977 the first private engineering college in Andhra Pradesh, i.e., V. R. Siddardha College of Engineering (VRSE) in Vijayawada was established. In 1979 three more private engineering colleges, Chaitanya Bharathi Institute of Technology, Hyderabad, Vasavi Engineering College, Hyderabad and NBKR Institute of Science and Technology at Vidyanagar, near Nellore were established. The growth of private engineering colleges picked-up in the year 1980 with newly six colleges was established. Later in 1981 and 1984 two more colleges were established and one college in each of the year 1985, 1986 and 1989 were established.

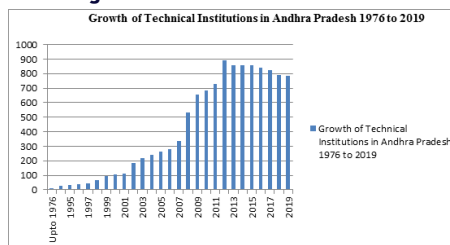
After a gap of six years in 1995 four more colleges were established in the year 1995 and three colleges in the year 1996. The growth of engineering colleges from 1997 to 2006 is substantial because of the boom in the software sector. The state government and AICTE opened the floodgates for private engineering colleges from 1997. The total number of engineering colleges in A.P. reached 281 with a total intake of 91,716 by April 2006. In 2008 the state government has introduced fee reimbursement scheme for engineering students and many engineering colleges started cropping-up during this period and the total number of engineering colleges in A.P. reached 535 by the end of the year. From the 2009 to 2012 gradually the number of engineering colleges increased and total reached to 893.

Table-2: Growth of Technical Education in Andhra Pradesh during 1976-2019

Year of Establishment	No. of technical institutions in A.P	Increase/Decrease (%)
Upto 1976	10	-
1985	25	-
1995	35	-
1996	38	8.5
1997	47	23.6
1998	64	26.5
1999	93	45.3
2000	106	13.9
2001	114	7.5
2002	186	63.5
2003	219	17.7
2004	238	8.6
2005	262	10
2006	282	7.6
2007	337	19.5

2008	535	58.7
2009	656	22.6
2010	685	4.4
2011	726	5.9
2012	893	23
2013	858	-3.9
2014	856	-0.2
2015	856	0
2016	842	-1.6
2017	825	-2
2018	791	-4.12
2019	783	-1.0

Graph-3: Growth of Technical Institutions in Andhra Pradesh during 1976-2019

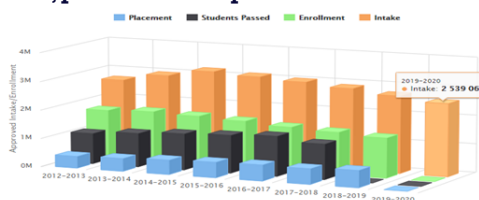


Since 2013 the number of engineering seats has been on the decline both in the state as well as across India as most private engineering colleges are unable to provide quality education to the engineering students that would match with the required skills to get them suitable jobs.

Present Status of Engineering Education:

In 2017-2018 two private universities started their campuses in new capital Amaravathi. Andhra Pradesh with a 7 per cent share in country's total population had 21.04 per cent share in the aggregate number of institutes and 23.07 per cent share in aggregate intakes, intake per million population being 4019.95. The number of engineering passed outs in India every year is more than the total number of engineers produced by the USA and China combined together. Only 45% engineering students got jobs through campus placements in 2017-2018. Nearly 20-30% out of the 1.5 million engineers in India are passing out every year run the risk of not getting a job at all. The remaining percentage of passed outs are working in jobs of lower grades. Nearly 652 colleges listed in the Eamcet counseling recorded "zero admissions" in 2017-2019 across India. In the country-wide nearly 150 colleges are closed down voluntarily every year due to the strict implementation of the AICTE rules. According to a rule of the council, colleges that lack of proper infrastructure and report less than 30% admissions for the last five consecutive years have to be shut down. The AICTE has approved the progressive closure of more than 410 colleges across India from 2014-15 to 2017-18.

Graph-4: Details of Engineering Students intake, enrolment, passed-outs and placement



Reasons for Decline:

- The administrative setup for managing technical institutions is highly centralized and does not give flexibility to institutions to respond to the needs of the society or organize courses in relevant technologies.
- There is over supply of engineering seats than the demand due to lowering entry barriers for establishing

engineering colleges like for instance , the minimum land required to set up an educational institution in rural areas over two decades ago was 25 acres. The limit has come down to 10 acres now. It is even lesser in metro cities

- Engineering colleges are supposed to work as not-for-profit entities with corpus funds and a philanthropy mindset but colleges established after 2008 has come-up to en-cash the government sanctions with absence, well-qualified staff , sound infrastructure and no emphasis on imparting quality education. So most of them fail to offer jobs or placements at the end of the course
- There is a lack of skilled and employable engineers coming out of present engineering colleges , due to lack of autonomy in the curriculum, development, evaluation system and testing procedures etc. and the principals and teaching community of these institutions are bound to follow these guidelines in many affiliated colleges , so the requirement of the society is not fulfilled
- Many engineering colleges fail to survive lies in their inability to offer any differentiation, value for money and most importantly, internships and industry connect, which is crucial for technical courses
- The higher literacy rates and relatively higher share of children graduating from schools, at least in most Southern states, which in turn has been the trigger for the opening up of a large number of technical institutions in South India that counts to 60 per cent of all engineering and MBA colleges in the country.
- With a lot of companies in the IT sector being concentrated in Bengaluru, Chennai and Hyderabad, the demand for the courses also increased, but at present the demand for the number of engineers also decreases with decrease in requirement in IT & ITES with increase in automation, large scale industries like the multinational companies (MNCs) are not increasing the job opportunities. It is highly demotivating for a student to not get a job after completing four years of under graduation.
- As number of private and deemed universities has started engineering courses in their colleges, students are now taking admission in these colleges instead of taking admission in an engineering course in an affiliated college. This has led to a decrease in the number of admissions resulting in vacant seats in several colleges
- Earlier people used to thinking that there are only 3 major fields to select after schooling that were - Engineering, Medical, Commerce but now students and parents are getting exposed to more liberal career paths and career counseling and preferring different courses like Aviation, Bio Technology, Animation and Media, Fashion and Design Technology, Food Technology, Hotel Management, etc.

Actions to be Taken

- In 2003, the government formed a committee to find out how technical education was doing in the country. The UR Rao Committee flagged a future glut of graduates. It was found that the technical education was expanding rapidly which could not be sustained in the long run as there wasn't as much demand for the supply of engineering graduates. Fifteen years later, the committee stands vindicated.
- Specially appointed committee of the AICTE decided to introduce ban on new engineering colleges from 2020 and to control increase in seats in traditional engineering courses.
- The committee suggested that allowing new and emerging fields with high employment potential, like artificial intelligence, internet of things, blockchain, robotics, quantum computing, data sciences, cybersecurity, 3D printing and design, and virtual reality are most welcome.
- AICTE to construct a curriculum that will make the student's job ready. The problem of vacant seats in the colleges could be solved if colleges follow the new curriculum model.

- AICTE is taking several steps to increase the employability quotient of the students. Internship for two years (in the third year and fourth year) has been made compulsory for all engineering students. Also, basic communication skills will be provided to the students.
- But it has to crosscheck whether the required infrastructure and industry linkage is available with all the affiliated colleges are not as corpus funds may not be available with many colleges.
- For internships the government should come forward to improve the academic industry relationships and establishing research centers to encourage research orientation in students and faculty.
- AICTE has passed the rule that if a colleges fail to admit more than 30 per cent of their capacity for three consecutive years, they automatically stand to lose their licenses and cannot admit more students, and continuous checks has to be made to follow the rule
- Faculty Development Programs are to be made mandatory in all technical institutions and faculty student ratio has to be maintained by all the colleges to renew license.

CONCLUSION:

The academicians suggest government to focus on investing in industries other than IT to reduce unemployment and to increase intake capacity of existing engineering colleges instead of shutting down as demand for civil mechanical and electronics engineering has decreased. More practical oriented teaching should be a part of curriculum and industry institution linkage has to be increased and internship should be made compulsory. Regular faculty development programs and awareness programs related to new upcoming technologies has to be provided to the faculty and students.

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