

Evolution of Technical Education in Colonial India: A Historical Perspective

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Abstract:

The present study attempts to explore the historical development of technical education in India specifically from 1902 to 1947, a period marked by significant changes and advancements. The article explores the various phases of technical education during this time frame, shedding light on its growth, challenges, and crucial moments. The early 20th century witnessed a growing awareness of the importance of technical education in India, driven by initiatives such as the Indian Institute of Science established by philanthropist Jamshedji Tata in 1909-22. The period also saw the establishment of engineering colleges, schools, and institutes across the country, indicating a shift towards prioritizing technical education. The study explores the Indian Education Policy of 1902, which played a crucial role in the rapid expansion of technical education. Notably, recommendations from various education committees, including the Hartog Committee Report and Sargent Committee Report, aimed to improve the conditions of technical education in India. The research discusses the growth of technical institutions at different levels, including Industrial Training Institutes (ITIs), Polytechnic Institutes, and Engineering Colleges. The statistics presented in tables demonstrate the proliferation of technical and industrial schools during this period. The study emphasizes the role of the All India Council for Technical Education (AICTE) and the Scientific Manpower Committee (SMC) in shaping the development of technical education in India.

Keywords: Technical Education, Colonial India, Historical Development, Education Policy, Pre-Independence, Growth and Challenges, Educational Initiatives.

Introduction

The ideal form of education should possess the capability to impart comprehensive knowledge while the reservoir of knowledge itself continues to expand. This educational paradigm allows students to evolve in their capacity for critical thinking and to align their actions with the principles of natural law, ultimately leading to a life devoid of errors and unnecessary suffering. The judicious identification and utilization of diverse knowledge sources, coupled with the practical application of this acquired wisdom in daily endeavors, culminate in the student's mastery of life's intricacies. It is noteworthy that in the years leading up to the 1990s, India experienced a remarkable surge in engineering and technical education, surpassing global growth rates. This trajectory has positioned India as the second-largest producer of engineering graduates worldwide.¹ Recent strides in Indian scientific, industrial, and technological domains, notably in areas such as space exploration, nuclear science, missile technology, computer engineering, and information science, have underscored the nation's accomplishments in these fields. Given that technical education plays a crucial role in shaping a nation's development and socioeconomic status, it becomes imperative for developing nations like India to cultivate a cadre of world-class engineering educators. These educators are instrumental in designing and implementing effective engineering education programs within their local universities.² Presently, a common trajectory for promising young talent from developing countries who aspire to engage in engineering education involves completing undergraduate studies within their home countries, followed by pursuing doctoral studies abroad, typically in North America or Western Europe. This practice underscores the global demand for high-quality engineering education and the need for cross-border academic collaborations.³

Historically, the impetus for technical education in India can be traced back to the establishment of the first engineering college in Uttar Pradesh in 1847. This institution, located in Roorkee, was dedicated to the training of civil engineers and made use of the extensive workshops and public structures constructed for the Upper Ganges canal project. Although the Roorkee College, officially known as the Thomson Engineering College, was not affiliated with any university, it granted diplomas that were considered equivalent to degrees. Following governmental policies, three additional Engineering Colleges were established around 1856, each situated in one of the three presidencies. In Bengal, the Calcutta College of Civil Engineering was inaugurated within the Writer's Buildings in November 1856.⁴ Its name was subsequently changed to Bengal Engineering College in 1857, and it became affiliated with Calcutta University. The institution offered a licentiate course in civil engineering. In 1865, it merged with the Presidency College. Subsequently, in 1880, it was separated from the presidency college and relocated to its current premises in Sibpur, occupying the facilities originally belonging to the Bishop's College.⁵

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Technical education is a dynamic field characterized by its continual evolution, adapting to the changing societal landscape from antiquity to the present day. In ancient India, the historical achievements in the domains of science, technology, town planning, civil engineering, and architecture, as exemplified by the remarkable city of Mohenjo-Daro, bear testament to the nation's rich heritage of knowledge and innovation.⁶ In the contemporary era, technical education in India has undergone significant transformation to meet the diverse needs of various sectors, including industrial, engineering, and technological domains. The growth and trajectory of technical education are intricately linked to the socio-economic and industrial conditions of the region, with its development intricately woven into the fabric of societal needs and requirements. The historical development of technical education in colonial India exhibited a dual structure, with one facet represented by colleges and universities and the other by schools. The pre-independence evolution of technical education in India can be delineated into three distinct phases: (a) 1800-1857, (b) 1857-1902, and (c) 1902-1947.⁷

In the present discourse, our endeavour is to delve into the state and progression of technical education in India during the crucial period spanning from 1902 to 1947. A noteworthy milestone in this chronicle was the convening of a significant meeting in Shimla by Lord Curzon in 1901.⁸ This gathering encompassed discussions on matters related to education, ranging from primary to university levels, with a specific focus on Industrial Survey Schools.⁹ The assembly resulted in the adoption of approximately 156 resolutions, many of which pertained to the realm of technical education in India. Lord Curzon's efforts aimed to expansively foster technical education. As the recognition of the imperative need for technical education in India grew, it paved the way for the establishment of institutions dedicated to this purpose, such as the Indian Institute of Science, founded by the philanthropic visionary Jamshedji Tata during the years 1909-22. The colonial era accorded high priority to technical education, envisioning it as a facilitator of the administrative apparatus of colonial India.¹⁰

During the Swadeshi Movement, a significant shift occurred, with numerous national educational institutions asserting their autonomy and distancing themselves from government control. Many of these institutions fervently embraced the mission of imparting technical education.¹¹ The tenure of Viceroy Lord Hardinge (1944-1948) witnessed a renewed focus on the advancement of technical education in India, affording it due recognition and importance.

Technical education in India predominantly finds its expression through diverse institutions operating at three distinct levels:

- A. Industrial Training Institutes (ITI), which offer trade courses designed to cultivate skilled workers.
- B. Polytechnic Institutes, which confer diplomas aimed at producing middle-level technicians.
- C. Engineering Colleges, which serve as the bastions for undergraduate and postgraduate degree programs in engineering and technology.

The period spanning from 1902 to 1921 marked a significant juncture in the recognition of the crucial role that technical education played in the societal development of India. The formulation and enactment of the Indian Education Policy in 1902 emerged as a transformative catalyst in the rapid expansion of technical education within the country's educational landscape.¹² It is imperative to acknowledge the seminal role played by the Indian Education Commission, whose recommendations led to the inclusion of both technical and vocational education in the curricula of high schools across various provinces of India. Furthermore, the discourse surrounding the advancement of technical education found resonance within the deliberations of several Annual Sessions of the Indian National Congress.¹³ These deliberations underscored the imperative need to promote technical education in India.¹⁴ Consequently, the establishment of the College of Engineering and Technology in Jadavpur, Bengal, came to fruition as a result of the recommendations put forth by the National Council of Education. This institution commenced offering diploma programs in Mechanical, Electrical, and Chemical Engineering, commencing in 1908 and 1921, respectively. Notably, Banaras Hindu University became the pioneer in conferring degree courses in Mechanical and Electrical Engineering within the nation.

In 1902, the University Commission articulated the necessity for a recalibrated approach in the development of technical education in India.¹⁵ A seminal moment occurred in 1913 when the Governor-General articulated a policy statement emphasizing the significance of technical and industrial instruction within the contemporary educational landscape. This declaration galvanized the momentum of technical education, catalyzing its proliferation throughout India. Institutions such as Engineering Schools and Government Polytechnics in Nagpur, as well as the Sir J.J. College of Architecture in Bombay, were established in 1914, collectively playing a crucial role in furthering the cause of technical education in India. The origins of technical education in colonial India can be traced back to the nascent interests of colonial authorities.¹⁶ The Abbott and Wood's Report of 1937 provided a concrete proposal outlining the contours of technical education and concurrently reflected the prevailing state and conditions of technical education within the country. Notably, the period spanning from 1919 to 1945 witnessed a gradual evolution and development in the landscape of technical education in India. Two crucial documents, the Hartog Committee Report of 1929 and the Sargent Committee Report of 1944, emerged as substantive repositories of recommendations aimed at enhancing the quality and scope of technical education in India. These committees offered a plethora of provisions and insights, shaping the trajectory of technical education in the country during this transformative era.¹⁷

The following Table provides information about the different kind of Technical Institutions that were present in 1927.

Kinds of Institutions	Number in 1927
1. University Department of Engineering	3
2. Engineering Colleges	4
3. Engineering Schools	10

The following Table provides information about the development of Technical Education in school level from 1917-1927

Provinces		No.of Technical and Industrial Schools		
		1917	1922	1927
1	Madras	40	41	63
2	Bombay	26	31	33
3	Bengal	59	86	153
4	United Provinces	28	37	111
5	Punjab	33	25	24
6	Burma	4	3	2
7	Bihar & Orissa	38	32	43
8	Central Provinces	9	7	2
9	Assam	7	12	15
Total Technical and Industrial Schools of the British India		251	276	450

The table presented herein offers valuable insights into the evolution of technical education in India. It is discernible from the table that the province of Bengal exhibited a consistent progression in the incorporation of technical education into the school-level curriculum. It is worth noting that the acceptance and adoption of technical education within society were contingent upon the economic and social circumstances of the students, as well as their psychographic inclinations.¹⁸ The impetus for engineering and technology education gained significant traction with the establishment of Banaras Engineering College (BENCO) in 1919, an initiative spearheaded by Pt. Madan Mohan Malviya. Concurrently, the establishment of the College of Mining and Metallurgy (MINMET) and the College of Technology (TECHNO) in 1919, 1923, and 1932, respectively, played crucial roles in catalyzing the advancement of technical education. Notably, these three engineering institutions amalgamated to form the Institutes of Technology (IT-BHU) in 1968.¹⁹

The period spanning from 1921 to 1937 witnessed the establishment of several technical schools aimed at promoting technical education across the country. Key institutions in this endeavor included the Indian School of Mines in Dhanbad, the Harcourt Technological Institute in Kanpur, and the School of Chemical Technology in Bombay.²⁰ The outbreak of the First World War momentarily disrupted the growth trajectory of technical education in India, only to witness a resurgence post-1919. This resurgence led to the establishment of five technical institutions for higher learning at the university level, a number that escalated to twenty-one by 1939.²¹ The period during World War II and India's attainment of independence marked a crucial juncture in the nation's commitment to the sustained growth of technical education. Notably, the number of diploma schools increased from eight to twenty-three during this period. Several institutions, including the Harcourt Butler Technologies Institute in Kanpur (1920), the Indian School of Mines in Dhanbad (1926), the University Department of Chemical Technology in Mumbai (1934), and the Engineering College in Aligarh Muslim University (1935), among others, were established to meet the evolving needs of Indian society. Enrollment in technical education experienced significant growth, surging from 0.126 million in 1936-37 to 0.201 million. The decade from 1931 to 1940 witnessed the establishment of key colleges such as Bengal Engineering

College in Sibpur, Guindy, and Poona, primarily focusing on the crucial subjects of Mechanical, Electrical, and Metallurgy.²²

The outbreak of World War II in 1939 ushered in a crisis in the realm of technical education, marking a turning point in its history. At that juncture, India possessed a mere ten or eleven engineering colleges, each with a limited annual intake capacity of approximately 200 students.²³ Recognizing the challenges faced in vocational and technical education, individuals such as Abbot, the former Chief Inspector of Technical Schools at the Board of Education in England, and S.H. Wood, the Director of Intelligence at the Board of Education in England, sought to address these issues. Their recommendations led to the emergence of a new category of technical institution, known as "Polytechnics," designed to provide training for middle-level technical personnel. Delhi Polytechnic, established in 1941 and later converted into an engineering college, emerged as the pioneer polytechnic institution in India.²⁴

A significant turning point occurred with the establishment of the All India Council for Technical Education (AICTE), initiated through a resolution of the Government of India (No. f16-10/4.E.1-II) in accordance with the recommendations of the Central Advisory Board of Education (CABE) on November 30, 1945. The formation of the Scientific Manpower Committee (SMC) under the chairmanship of Dr. Shanti Swarup Bhatnagar, Secretary, Ministry of Education, and Educational Adviser to the Government, ushered in a new era of development in higher technical education in India. Emphasis was placed on harnessing human resources for industrialization through scientific education and training. The Nalini Ranjan Sarkar Committee was instrumental in shaping the trajectory of higher technical education. This committee conducted an exhaustive survey of the state of technical education in India, offering significant recommendations for post-war reconstruction. Its report, initially submitted in 1946 and subsequently published in 1949, advocated the establishment of four higher technical institutions, one each in the East, West, North, and South. These developments collectively propelled the growth and development of technical education in India.²⁵

In the context of India, a nation where agriculture serves as the primary occupation, it is a matter of lament that agricultural pursuits have not historically received commensurate recognition and emphasis. Recognizing the pressing need to cultivate a cadre of individuals equipped with both education and training in contemporary agricultural methods, an agricultural school was established in Saidapet in 1876.²⁶ This institution undertook the manufacture and repair of a diverse array of agricultural implements and tools tailored to the specific requirements of the Indian agricultural landscape. To gain a holistic understanding of agriculture, the curriculum of this school encompassed a spectrum of subjects, including chemistry, geology, zoology, botany, veterinary science, and the theoretical and practical aspects of agriculture. Subsequently, this school attained the status of a college in 1886, marking a pioneering milestone in the annals of Indian agricultural education.²⁷

In recognition of the evolving dynamics within the realm of agriculture, the Government responded by revising the course of instruction, in alignment with the recommendations of the Board of Agriculture in 1906. This revised curriculum encompassed comprehensive instruction in veterinary science, agricultural engineering, and both the theoretical and practical facets of agriculture. As agricultural practices continued to evolve, the curriculum underwent periodic reorganization to remain current and relevant. In 1920, a committee was convened with the mandate to elevate the stature and standing of the agricultural college. This committee recommended that the college should attain affiliation with the prestigious Madras University, a status that was duly conferred in 1922. This affiliation facilitated the introduction of a Bachelor of Science (B.Sc) Degree course in Agriculture, further augmenting the institution's academic offerings.

By 1926, the institution had evolved into a research institute, serving as a crucible for pioneering research endeavours in both the theoretical and practical facets of modern agriculture.²⁸ Students were afforded invaluable opportunities to engage in research pursuits, spanning a gamut of agricultural domains. Their training encompassed hands-on involvement in every facet of farming operations, including animal husbandry, the operation of farm equipment, cultivation in both arable and wetlands, as well as irrigation practices. Furthermore, students were tasked with the cultivation of transplant seedlings and the threshing of agricultural produce. The advent of partial mechanization within the agricultural sector necessitated a comprehensive exploration of topics such as agro-climatology, weed management, water resource management, biofertilizers, pest surveillance, seed technology, animal husbandry, and soil fertilization. These subjects assumed paramount importance in the pursuit of a thorough and exhaustive understanding of modern agricultural practices.²⁹

During the period of British colonial rule in India, several significant developments in the field of technical education emerged, contributing to the nation's evolving educational landscape. These noteworthy developments encompassed the following key aspects:

1. **Engineering Education:** The British administration established engineering institutions in various towns across India to meet the needs of colonial governance and infrastructure development. Notable among these institutions were the College of Engineering in Roorkee, founded in 1847, and the Indian Institute of Engineering Science and Technology in Shibpur, established in 1856. These institutions aimed to impart specialized training to engineers who could contribute to the engineering and construction projects undertaken by the colonial government.³⁰

2. Technical Schools: Technical colleges were instituted to provide practical instruction in various trades and crafts. These institutions focused on equipping individuals with skills in areas such as surveying, drafting, mechanics, and carpentry. Prominent examples include the Mayo School of Art in Lahore, founded in 1875, and the Thomason Civil Engineering College in Roorkee, established in 1845. These technical schools played a crucial role in nurturing skilled professionals in their respective domains.
3. Industrial Education: In an effort to support the burgeoning industries in India, the British government initiated industrial education programs. These initiatives aimed to equip workers in industries such as agriculture, mining, and textiles with practical skills and knowledge. Industrial schools and workshops were established to prepare individuals for specific trades, thereby contributing to the growth of indigenous industries.³¹
4. Expansion of Technical Education: Initially, technical education in India was primarily accessible to privileged Indians or British nationals. However, efforts were made to broaden access to technical education with the establishment of the Indian Industrial Commission in 1916. This initiative facilitated the provision of grants and scholarships to Indian students, enabling them to pursue technical education both within the country and abroad, thereby expanding the pool of trained professionals.
5. Role of Universities: British authorities introduced technical education programs within universities in India. Notably, the Universities of Calcutta, Madras, and Bombay incorporated technical courses into their curricula as early as 1857. This integration of technical education within university settings aimed to provide students with a comprehensive educational experience that combined theoretical knowledge with practical skills.
6. Emphasis on Practical Training: The British recognized the importance of blending theoretical education with practical training. To this end, workshops, laboratories, and field training became integral components of technical education institutions. These facilities were designed to provide students with hands-on experience and real-world application of the knowledge they acquired in classrooms, ensuring a well-rounded education.

These developments in technical education under British rule underscored the colonial government's recognition of the need to cultivate a skilled workforce and promote industrial and infrastructural development in India. They laid the foundation for the subsequent growth and diversification of technical education in the country, leaving a lasting impact on its educational structure.

Conclusion

The domain of technical education has exhibited dynamic evolution over the course of its history. Within the colonial context of India, the establishment of numerous institutes, engineering colleges, and polytechnics marked significant milestones in the provision of structured and purpose-driven engineering study programs. These educational institutions served as avenues for students to pursue degrees and diplomas in engineering and polytechnics disciplines. It is worth noting that many of the technical educational institutions established during the colonial era were primarily driven by colonial interests and objectives. However, as the 1930s unfolded, a notable surge in the establishment of educational institutions occurred. These institutions attracted students from diverse societal strata and offered comprehensive engineering study programs with well-defined objectives. The expansion in technical education not only facilitated increased job opportunities for students but also enabled them to gain a profound understanding of their strengths and weaknesses. It often served as a platform for individuals to recognize their responsibilities and aspirations, thereby contributing to both personal and societal development.

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