

OCCASIONAL PAPER NO. 123

SOME ASPECTS OF THE POLICY ON TECHNICAL AND  
INDUSTRIAL EDUCATION IN INDIA UNDER COLONIAL  
RULE; FROM LATE NINETEENTH CENTURY TO  
INDEPENDENCE

SAUGATA MUKHERJI

JUNE 1990



Centre for Studies in Social Sciences, Calcutta  
10, Lake Terrace,  
Calcutta - 700029.





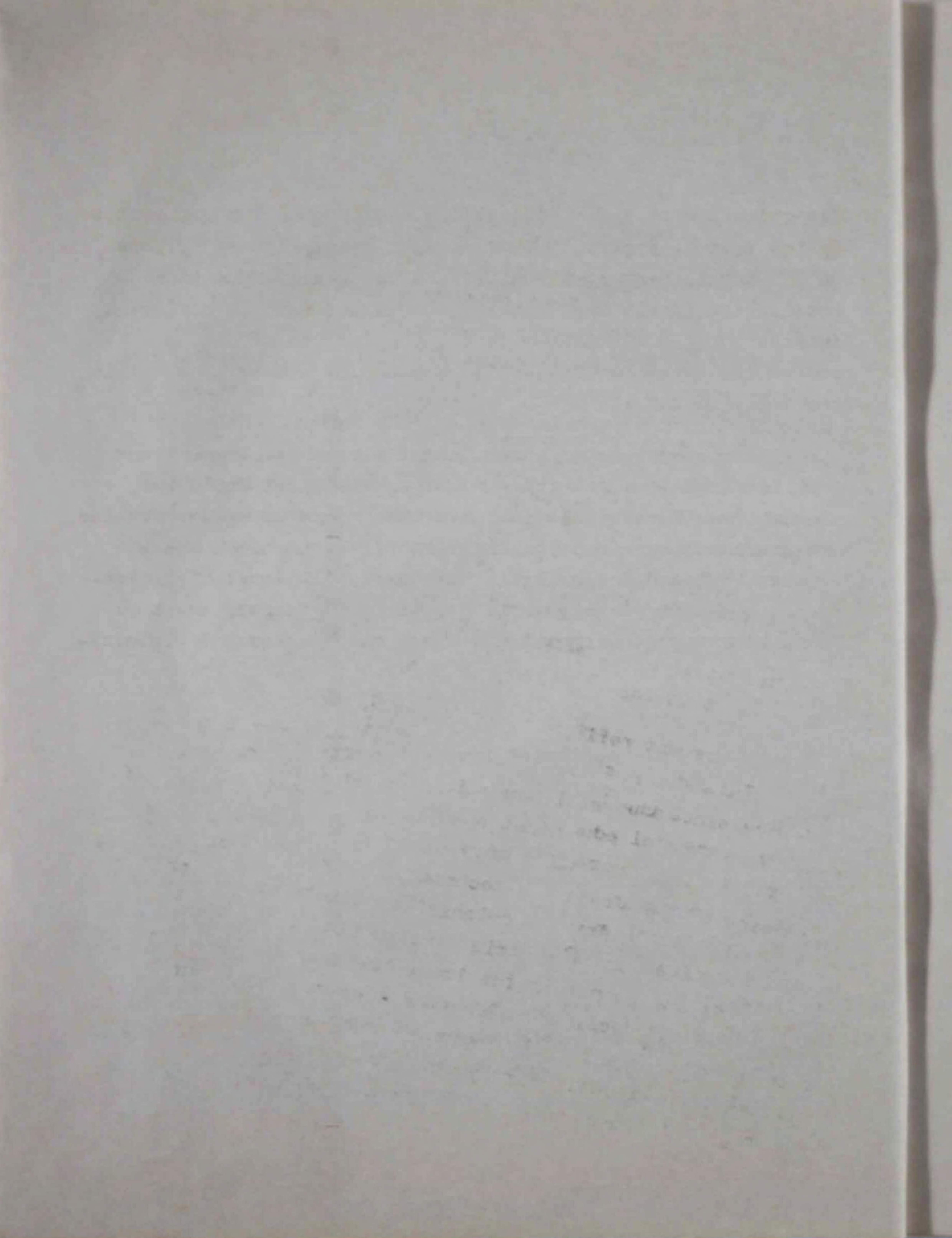


## Abstract

Colonial policies on industrial development and development of technical education in India through the late nineteenth and early twentieth centuries were like two parallel lines that could never meet. This was because the basic interests and aims of the imperial system precluded any full fledged economic development of the country that necessarily had to include modern industrial development. This factor in itself decelerated the growth of technological knowledge and skills within the society. Colonial policy on education, over and above all this, did not lead to any real development of the personality among its recipients. In fact, it created a rupture between the real life at home and the material considerations of professional life outside the home. The resultant blurring of perception did not encourage any fulfilment of an aspiration for awareness or development of the personality.

This was reflected in the top-heavy structure of technical and industrial education that grew up in this country since the late nineteenth century. Institutions of higher technical education more often than not turned out a handful of bureaucrats and technocrats for maintaining and running public or private colonial institutions or enterprises, while technical and industrial instruction for a much larger section of the people in the lower strata of the society languished and declined. Repeated surveys throughout the late nineteenth and early twentieth centuries clearly demonstrated such trends. Surveys by local governments brought out regional weaknesses in industrial development and the



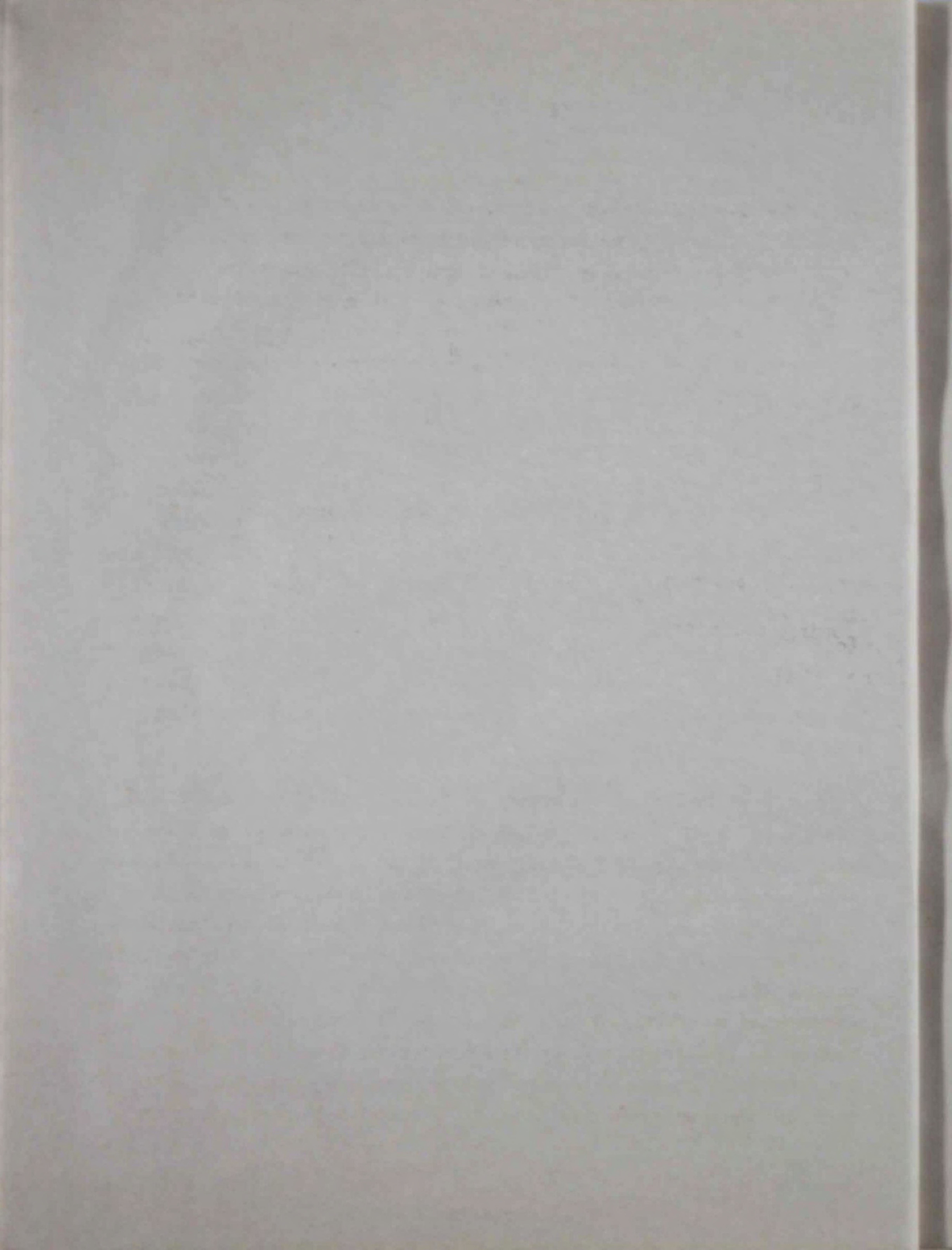




dissemination of industrial skills. Often the top authorities in the seat of imperial power pursued contradictory policies on the development of technical and industrial education because frequently they had to give concessions to different interest groups within the imperial system or effect some compromise between different or contending sub-systems within the imperial order.

The setbacks suffered in industrial development and technological growth during and after the First World War, through the Great Depression upto the Second World War created a situation where India at the time of Independence was a country with a low industrial base and a low level of technological competence because of the lack of adequate means of developing technical knowledge and manufacturing and organizational skills.







Some aspects of the policy on technical and industrial education in India under colonial rule; from late nineteenth century to Independence

I

The tradition of technical training has a long past in Indian society; training in the skills of different types of manufacture and craft were given in family work sites, workshops belonging to clan or caste guilds. Generations of artisans acquired these skills and carried on their hereditary occupations for centuries before the British came to India. Technical education and industrial training of a 'modern' kind was, however, introduced by the British in order to support the restricted industrial base that started to grow somewhat slowly and haltingly from around the middle of the nineteenth century. Some attention had also to be given to the training of the small industrial work force that was also emerging alongside.

But colonial policies on industrial development and promotion of scientific and technical knowledge or skills were like two parallel lines that could never meet. This was something that was built into the situation; moreover, it would perhaps be a mistake to deem such steps as the authorities took in these two related areas as a part of any definite, coordinated policy. In developed western societies also, industrial development and the growth in scientific and technical knowledge and skills had taken a separate course, but in those cases, the development had been dynamic, with forces released from one line of development converging on



and enforcing the strength and growth of the other. In India from around the mid-nineteenth century to Independence there were scattered and sporadic developments in both fields which the policy framers did little to relate or connect together in order to bring about an industrial transformation of the country.

Colonial administration approached the question of technical and vocational training in the light of some pedagogic assumptions that flowed from past experience in the country of its origin. This included an awareness that the growth in technical knowledge and industrial skills had followed from some given social and economic necessities. Its attitude was further conditioned by the experience of its own initial attempts at introducing and extending general western education in this country. In a sense, most of the experiments tried out in the area of technical education were in the nature of a repetition of earlier attempts to "attain through education what had been denied to the country ... because of [the] very system of economic exploitation". (Sen, 1977, p.41).

Behind such pedagogic assumptions, then, acted two different tendencies which largely threatened to cancel each other out. One was the wish to repeat a particular historical experience by using education and instruction in certain skills as an instrument to bring about that desired change. The other was to set limits on this process all the time for the preservation and consolidation of the larger metropolitan interests which ultimately meant a large scale transfer of real resources from the subject country.



The major facts about the progress of western education in India as well as the decline in indigenous religious education and secular primary rural education are all too familiar. Nevertheless, a quick recital of facts connected with the magnitude of such changes is perhaps necessary in order to clarify the context of the beginnings of technical education in this country. The quinquennial reports on the Progress of Education in India (and various one-time surveys before this particular series began to be published) reveal all too clearly the story of the dwindling numbers and the impoverished state of tols, pathshalas and madrassas not only in the big port towns and Presidency areas but also far in the hinterland like Punjab. On the other side of the scale was the steep rise in the number of pupils studying English and the mushrooming of Anglo-Vernacular schools and colleges all over the country. Between 1855 and 1902 the number of secondary schools rose from 281 to 5124 and the number of students from 33801 to 590129. Over the same period the increase in the number of colleges was from 28 to 91 and enrolments in them from 4158 to 23009 [Siddhanta, 1965 (1978), p.728]. Along with this sharp increase in the number of people seeking English education was the growth of private enterprise in the education industry working on a profit basis. The Education Despatch of 1854 had indicated the importance of private initiative in the spread of western education with the role of the government being restricted to providing grants in aid only. This fundamental belief in a policy of laissez faire was repeated time and again in different government policy declarations and resolutions till well into the twentieth century. Only a few government schools and colleges came into being during this period. They were supposed to serve only as model institutions and were quite expensive. In the meanwhile, missionary and evangelical institutions which



had taken the initiative in the early years and were mostly philanthropic dwindled in proportion to the fast growing private institutions working on huge profits. The proportion of income from tuition fees to total expenditure on education registered a sharp increase in every province of British India around the turn of the century. By the time of the first world war private high schools in Bengal alone constituted 92.8 percent of the total number of high schools in the province and the increase in their numbers in other provinces was also very high (Siddhanta, 1978, p.731). The Calcutta University Commission (1917-19) spoke about fraud and speculation with trust funds, manipulation with salaries of teachers and the worst kinds of economies in buildings and academic standards, when it investigated the performance of private enterprise in education.

Another development, perhaps even more important in the context of technical education was the smashing up of the indigenous system of primary education and the absence of any noticeable growth in primary mass education under official patronage for a long time. A comparatively recent presentation (Sanyal, 1984) has very clearly demonstrated the process of this decay and destruction of primary rural education in Bengal through almost the whole of the nineteenth century. Earlier, these institutions used to equip different caste and occupation groups in rural Bengal in practical matters of their own vocation, in the three B's and some simple mathematics over and above simple arithmetic.



The smashing of the rural economy and the destruction of the rural education system went alongside the unrelenting expansion and onslaught of British imperialism. While the indigenous forms of popular rural education were withering away, little was done in the field of primary education at the official level. As late as 1881-82, only seven per cent of children of school going age were attending primary schools and ten percent of boys and less than one per cent of girls of school going age were enrolled. Between 1897 and 1917 there was a much less proportionate increase in the numbers and enrolments in primary schools compared to secondary schools, while the highest rate of increase was registered at the collegiate level. Poverty forced a large number of children to drop out of school after only two or three years, or even after only one year, before they had the opportunity of acquiring bare literacy.

While the government was unable or unwilling to bear the responsibility of spreading primary education, it tried to shift the burden of it on to the shoulders of local bodies, a move which did not usually pay off. Attempts at imposing levies on local landholders as in the North Western Province in 1851 fizzled out as the funds collected were not adequate and the landholders insisted that they had earned the right for their children and other relatives to go through secondary, and even higher levels of education. Despite the recommendation of the Education Commission of 1882 to make primary education free and compulsory, nothing was done for a long time. As late as in 1913, a government resolution on education policy stated that the time was not ripe for doing away with fees in primary education. It was only in 1917 that a compulsory primary education bill was passed in Bombay. But even in



this case, only small children were to be seen attending primary schools. Parents preferred to take away their children when they had reached the age of ten or eleven, their labour in the household being worth more than the token fine that had to be paid for this purpose.

Confronted with such an obviously bleak situation in the society and economy in India as well as in primary and general education, administrators in education had to take a long and hard look at some of the pedagogic assumptions that they had started with before the middle of the nineteenth century. This reexamination of some of the basic premises of education policy had an important bearing on developments in the area of technical and industrial instruction. This particular branch of education, with only a rudimentary beginning around the middle of the nineteenth century, increasingly occupied the attention of some sections of policy framers in the later years of that century.

Instances of such rethinking about the basic aims and objectives of spreading western education in India are numerous. The scope of this paper does not strictly permit any attempt at describing the processes of that reasoning. One can only briefly refer to, in this context, one particular set of statements as an example of a questioning of the original premises because it constitutes a rather unusual example.

This set of statements [ (Mayhew, 1926), (Mayhew, 1938) ] is not of any outstanding merit, nor does it make any really significant contribution in the articulation of the need for new pedagogical tools that could replace obsolete methods. At the same time some of the main objectives of imperial



education policy were questioned and some hypotheses were put forward to explain why that education system did not really work. Referring to Macaulay's total indictment of Sanskrit and Arabic learning and his assertion that elementary school books in England contained more scientific knowledge than all the wisdom of the east put together, Mayhew (1926) argued that western education in India failed to address the religious beliefs and sentiments of Indians, indeed threatened them. This was one of the main reasons why it never became an integral part of Indian life. The gap between the real life at home and the material world outside was the essential difference between what had happened in the western world in the previous hundred years and more and what was taking place in India and other areas of the non-white empire in the late nineteenth and early twentieth centuries. In the west, the educated person or the technically qualified person had the experience of participating in a process of social transformation affecting and changing relations both at home and in the society at large. In countries like India there was no apparent connection between what was believed in and practiced at home and what was being done outside the home in order to earn a living. This fracture of the personality encouraged educated or technically qualified Indians to lead a kind of double life in which the ways and norms of one kind of life ended where the other began.

The forces of resistance to the spread of western education, it was argued (Mayhew 1926), were to be identified in the beliefs and institutions of the two principal communities in India, the Hindus and the Muslims. The Hindu way of



life was closely linked with the caste system and a joint family organization. The early moves in the direction of the spread of English education at the cost of vernacular education had resulted in a separation of the mass of rural population with the educated urban middle class and the separation of women from men in the middle class household. This was because the colonial system of education in India had at first sought to exclude women altogether, then slowly and gradually admitted them as a supplementary and decorative, but not an essential element.

Muslim society in India was quick to perceive the challenge to its own convictions by the spread of western education, grasping more fully the implications of the militancy of the activities of Christian missionary agencies. Statistics revealed how comparatively ineffective the appeal of a western curriculum was for the Indian Muslim. So far as Muslim women were concerned, the penetration of western ideas and western influence was even less, in fact far less than in the case of Hindu women. It was significant, it was therefore argued, that even in the middle of the third decade of the twentieth century Muslim society had responded far less to the western way of life and practices than the Hindu community.

In the matter of the content of the curricula (the choice of subjects, the nature of textbooks, etc), the opinion expressed was that it was entirely alien to the Indian mind and character and left a person totally unequipped to function as an independent being in material life or to acquire any cultural awareness. But at no time did Mayhew challenge the intentions or motives of the British in India. He only thought that good intentions were dangerous. The government,



at the outset, in its desire to save India by substituting its own culture for what was indigenous, 'may remind some of the well intentioned lady elephant, who atoned for her destruction of the brooding hen by sitting on its eggs'.

Mayhew raised more basic questions, however, in his later work (Mayhew, 1938) after having served as a delegate to two League of Nations conferences on education and being exposed to pedagogical ideas from Germany, the USA, as well as from less advanced countries. In this work on education in non-white British colonies other than India, he challenged the right of the western educator to be present and active in such places, and more fundamentally, his right to attempt a transformation of the life style and value systems of other non-European peoples through education. He illustrated his theme with convincing examples from experience in South East Asia and the South Pacific, Southern and Eastern Africa and the West Indies.

It is against this overall background then, that the beginnings that were made in the field of technical education and industrial training have to be viewed. Not only was the base of primary education extremely fragile, the top-heavy liberal-cum-theoretical science education structure had created a sense of alienation for individual persons with their surroundings. Other objective conditions for the growth of technical education and industrial training were also highly unfavourable. De-industrialisation through the nineteenth century had destroyed many skills in different crafts. The tradition of the passing on of such skills from generation to generation had also withered away. The growth of modern industry, through inflow of private capital from the metropolis



(which later became reinvestment of profits made in this country) and public expenditure made mostly from taxes raised in India was slow and halting. From the middle of the nineteenth century, railway construction and maintenance, and public works, in that order, began to emerge as the core sectors in modern industries in India, followed by other private plantation, mining and manufacturing industries. Superior posts in the railways and public works were reserved for civil servants and technical personnel from Britain, but for subordinate posts and semi-skilled labour, Indians had to be employed, and so it became necessary to train up some Indians in technical jobs. So far as private industry was concerned, it is now an established fact (Bagchi, 1972, pp.151-6, 205-6) that expatriate firms preferred to employ their staff from the country of their origin, from the supervisory and managerial cadre to positions at the foreman's level. Referring to such examples of racial discrimination, another kind of opinion (Crane, 1966, pp.167-201) has been expressed that it was really a case of mistrust of Indian skill and efficiency on the part of foreign firms.

In the west coast of India, where Indian enterprise could make some headway, the scope for expansion of technical training for Indians was also somewhat greater, though it was realised to any noticeable extent only from the early twentieth century. But from late nineteenth century, the colonial administration began to realise the importance of training up Indians for subordinate technical posts and training up workmen for the modern manufacturing and transport industries. From the initial years of the twentieth century nationalist Indian opinion began to press forward its demand for industrialization and spread of technical education in a much more articulate manner than before.



## II

The beginning made in the field of technical education in India at the collegiate level was the setting up of engineering colleges in the three Presidencies of Bombay, Bengal and Madras and in the United Provinces. These were the Sibpur and the Poona (Pune) Engineering Colleges in Bengal and Bombay, respectively, the Madras Engineering College and the Thomason Engineering College at Roorkee in the North Western Province (later, part of the United Provinces).

The Engineering College for Bengal had originally been set up in Calcutta in 1856 by the Public Works Department for training engineers and subordinate technical staff to work in that particular department. In 1864 it was placed under the Education Department and transferred to Presidency College, Calcutta. In 1880 it was moved to its present site at Sibpur where the P.W.D. was building large workshops, and there it was established as a civil engineering college (Govt. of Bengal, 1908, p.11).

In the Bombay Presidency, engineering classes and a mechanical school were started at Poona in 1854. This was the nucleus of the Poona Engineering College that was subsequently set up. In that very year, 1854, the Government of India considered a proposal for an engineering college for the Bombay Presidency. In 1855 and 1857, the Bombay Government framed schemes for the establishment of a college at Poona for civil engineers, surveyors and builders, and mistris. By such gradual stages the original engineering classes developed into a regular college. In 1866 the college was affiliated to the Bombay University and a degree of Licentiate



in Civil Engineering was instituted. The provincial government offered one appointment in the engineering branch of the P.W.D. to the senior student who passed this examination. Besides, three appointments in the upper, and three in the lower subordinate divisions were also made from among the students of this college. In 1872 the university course for the L.C.E. was remodelled and architecture and mechanical engineering were added to the number of optional subjects. The engineering course was fully revised in 1909 for the newly created degree of Bachelor of Engineering and special training for mechanical engineers was provided for. This particular branch continued to grow specially after the completion of a new engineering laboratory in 1914 (Govt. of Bombay, 1923, pp. 76-81).

The origins and the process of growth of the Madras Engineering College has been traced in some detail elsewhere ( S. Ambirajan, forthcoming). It is interesting to note, as brought out in the paper that this college, too, was started at the initiative of the Madras Department of Public Works but was soon transferred to the Education Department. Here, suggests Ambirajan, the pattern of similarity between engineering colleges in India and the subsequently famous Tokyo Engineering College ended. The establishment of the engineering college in Tokyo 'has been claimed as an important milestone in Japanese development because it was this college that acted as a catalytic agent for the emergence of Japanese technical eminence in the future'. In contrast, the growth of the Madras Engineering College, like other such institutions in India, was sluggish and lacked direction, 'because chance more than foresight determined how the future was to be'.



The Thomason Civil Engineering College at Roorkee, established in 1847 received its name from the Lieutenant-Governor of the North Western Province at that time. The main function of this college at the beginning was to supply the Public Works and the Survey Departments with Assistant Engineers, Overseers and Sub-overseers. It was affiliated to Calcutta University in 1864 and started offering three different courses of training; the Engineering class, the Upper Subordinate class and the Lower Subordinate Class. The engineering class was open to Europeans and 'statutory natives of India' who had passed the Entrance Examination of a University or any similar other test. The students had to go through a two years' theoretical course, when they also received practical instruction in surveying and preparing projects. After that they were eligible for appointment as engineering apprentices, as and when there were vacancies. If so appointed, they had to take further practical training in their own field. From among these students, four or five appointments were made, in every alternate year, for posts of Assistant Engineers in the Public Works Department. The Upper Subordinate class courses consisted of two years of theoretical instruction and another year of practical training and were open to Non-Commissioned Officers from British regiments and 'natives' of India. The Lower Subordinate Class was for Indians only. Students visited the Roorkee workshops in the neighbourhood, belonging to the provincial government, but did not have to perform manual labour as in Sibpur or Poona (Govt. of India, 1968, selections, 1886, pp.16-27).



It was in the 1880s that some positive steps were taken regarding the structure of technical and industrial education at different levels. As A.P. MacDonnell's memorandum on technical education of 23 July 1886 pointed out, the defects in the engineering colleges at Sibpur, Madras, Poona and Roorkee seemed to lie in the very theoretical nature of courses and teaching at these institutes, in their relative isolation from the commercial and manufacturing world and the lack of facilities for practical training in Madras and Roorkee. But the most acute problem was the nearly total absence of elementary and secondary schools that could lead up to these college courses. He argued in his note that industrial schools and technical training should not be considered as separate and unconnected with general education, but as an extension of such education. Supporting the scheme for bifurcation of studies proposed in the India Government resolution in 1884, MacDonnell proposed that such bifurcation should lead towards three different courses or streams at the end of the middle school level. These would be, first, the literary stream of high school, then the 'modern' or scientific stream and the third - courses conducted at divisional or district technical schools which should be placed under a central institution like a Technological Institute in each province (Govt. of India, 1968, pp.2-3).

In the second part of his report, MacDonnell gave a very detailed survey, province by province, of the state of general, legal, medical, engineering and industrial education. It may be mentioned, very briefly, that MacDonnell pointed out from the 1884-85 Education returns that the number of pupils in public and aided schools in British India was



309500 of whom 266500 were in primary vernacular schools where no technical instruction was given. The remaining 43000 received more advanced instruction (about three-fifths among them learning English) but only 6287 got any technical or professional education to equip them for an independent livelihood. His detailed survey of the state of education in the different provinces of British India yielded important findings about conditions in industrial and technical instruction which can be mentioned here only very briefly. His master table (Govt. of India, 1968, Selections, 1886, pp.18-19) showed that engineering students at the university level were naturally concentrated in the four provinces where there were engineering colleges, Bombay, Madras, Bengal and N.W.P., or U.P., as it came to be known subsequently (along with Oudh, or Awadh). The number of students enrolled in the four different colleges the highest was at the Thomason Engineering College at Roorkee, followed by Poona, Sibpur and then Madras. At the school level, there were seven survey schools in Assam, followed by five each in Bengal and the Central Provinces, two in Bombay and one in Madras; while there were 19 industrial schools in Central Provinces, seven in Bombay, six in Madras, five in Bengal, four in Punjab, two in N.W.P. and one each in Assam and Burma. Schools of agriculture were in existence only in Bombay and Madras, while Bombay had in addition, 36 high schools which conducted courses in industrial art and design and 38 schools which offered courses in agriculture. Also interesting were some figures giving a comparison of the three major cities. Calcutta had the highest number of law graduates, 1052 to 231 in Madras and 131 in Bombay; while those who had graduated in medicine numbered 89 in Calcutta, eleven in Madras and none in Bombay.



The Universities of Calcutta and Madras could award the degree of Bachelor of Engineering, the equivalent in Bombay was the L.C.E. (Licentiate in Civil Engineering). Calcutta had also an L.C.E. degree but it was of a much lower order meant for those training to be sub-overseers or for positions in the upper and lower sub-ordinate divisions of the P.W.D. and other government departments. The numbers of B.C.E.s from Calcutta and Madras were 27 and 38, respectively, while Bombay had as many as 117 L.C.E.s. The number of L.C.E.s of the Calcutta variety was 92 (Govt. of India, 1968, Selections, 1886, p.28) [All the figures given were for the year 1884-85]

MacDonnell's report also contained a detailed survey of the lower industrial schools in the different provinces of British India, their curricula and the nature of practical training given in these institutions. In the Madras Presidency, the aim of the Madras School of Art was the development of those industrial arts which were meant for construction and decoration of articles (metal, wood, stone or clay) and the supply of skilled labour for various arts in the districts. Some students obtained suitable employment. The Madras Education Report for 1883-84 stated, 'the engagement of one (student) as a designer of textile fabrics in a coral firm is specially gratifying, for it is in relation to improved design that the school is calculated to benefit the industries of the country. Instruction in free hand was more successful than that in geometrical drawing, the failure .... being probably due to the low general educational standard of most of the students (Govt. of India, 1968, Selections, 1886, p.29).



There were also six industrial schools in the presidency, three being situated in Madras and three in the districts. Madras also shared with Bombay the distinction of being the only two provinces in India with agricultural schools. It was however, only in Bombay that an early beginning was made by introducing agriculture and art classes in high schools at Dhulia, Ahmednagar, Belgaum, Nasik, Sholapur, Surat, Hyderabad (Sind) and Nadiad. Model farms were established in all these places and agricultural classes were started for children of agriculturists with scholarships at Rs.4/- a month to attend the model farms for practical training (p.36). The progress of industrial schools (pp.32-34) was described to be very satisfactory and engineering classes were started at some high schools in the Presidency, like that in Hyderabad (Sind). The Bombay School or the Jamsetji Jijabhai School of Art, according to the Education Report of 1884-85 showed continued expansion of its influence over high schools not only in the Presidency, but also outside, like Nagpur, Bhuj, Rajkot, Kolhapur, Baroda and Amraoti.

MacDonnell found evidence enough from his survey that so far as professional training in law and medicine was concerned, Bengal was well equipped in both. 'The law possesses great attractions for the Bengali mind, and the law classes in the various colleges are well filled', (p.40). The Sibpur Engineering College had made some progress but had not succeeded in attracting sufficient students mainly because of the absence of preparatory technical schools. The Calcutta School of Art was gradually becoming popular around this time and the government was formulating plans for a more centralized control over this institution. About industrial schools in the province,



the report added, 'On the whole, however, Industrial Schools in Bengal are at present mere excrescences on the educational system, formed on no plan, and having no well-defined object in view' (p.42).

Similar unfavourable judgments were given about industrial schools in Punjab. The Director of Public Instruction of the province was quoted to have reported that industrial schools in Punjab 'have a tendency to degenerate either into charitable institutions or into factories supported by public funds. They do not introduce improved methods or special skill. The technical instruction they impart can be better obtained in local workshops, while the general instruction can be more effectively and more cheaply given in night schools' (p.46). The Mayo School of Art at Lahore, on the other hand, was reported to be a flourishing institution. According to the Principal of the school, the bulk of the students came from the artisan classes and the aim of the school was to train craftsmen in 'the higher and more artistic branches of their crafts, more especially in the principles of design...' (p.44).

There was no art school or any important industrial school in the North Western Province and Oudh. The Imperial Forest School at Dehra Dun, established in 1878 for the technical training of executive forest officers was the only important technical institution in the province apart from the engineering college at Roorkee. Very little was reported on the provinces of Burma, Central Provinces, Assam or Hyderabad and Coorg (pp.49-53).



While the existing situation was far from encouraging, no other provincial government except Madras gave any indication of taking positive steps on the basis of the Government of India order of 23 October 1884 for implementation of bifurcation of studies and effecting improvements in practical and industrial training. The report of the Director of Public Instruction, Madras, 1885, proposed a general scheme of general and secondary education from which various branches of practical and industrial instruction would emanate. Detailed schemes were proposed for a system of public examinations, organization of government schools and training of teachers. The curricula and contents of different subjects were spelt out at each level of qualifying examinations, combining theoretical training with practical work, specially in technical fields and vocational training. While the Bombay Government was considering proposals for the extension of the system of technical training, there was no reaction from Bengal apart from the expression of general agreement with the policy laid down. There were also no practical measures initiated by the provincial governments in N.W.P., Punjab, Assam and Hyderabad and Coorg. The Director of Public Instruction of the Central Provinces, with the backing of the Chief Commissioner of the province stated categorically that no active measures could be expected from the local government. He pointed out that institutions for technical and industrial training in the Central Provinces were affiliated to the Bombay, and to a lesser extent, the Calcutta Universities. It was up to these universities to initiate new measures (pp.54-66).



In conclusion, the report made the following observations. (pp.70-71). A flourishing town like Rangoon in Burma was without a medical school. Art schools in the three presidency cities and in Lahore had left very little impression on the industrial life of the country, 'not because their aims are untrue - but because they keep no touch with the industrial system they are supposed to assist and improve'. The 45 so-called industrial schools, cut off as they were from any communication with the art schools and not modelled on any considered plan 'never rise above the level of mere workshops for production of inferior articles at extravagant cost'.

The Government of India's attitude around this time, as expressed in Resolution 199 of 18 June, 1888 was that it would be premature to establish technical schools on a large-scale since it thought that there was not sufficient demand in the commercial world for such trained personnel. However, schools of drawing and design might be attached to the great railway workshops and factories and that in large stations and municipal towns there would be a demand for professionally trained people which would repay those who acquire superior skills in local industrial schools (Govt. of India, 1968, pp.2-3). One other important development in 1888 was the setting up of the Victoria Jubilee Technical Institute in Bombay city largely financed by Dinshaw Manekji Petit and from subscriptions raised from the Ripon Memorial Fund and the Jubilee of the Queen Empress Fund. Training of students was basically concentrated on three sessions of mechanical engineering. The Ripon Textile School was also attached to this institute. All textile and many engineering students who completed the course usually found ready employment. In



time this institution became one of the premier technical institutes in the country with appropriate buildings and apparatus and equipments. Students from all over India and some even from abroad came to the V.J.T.I., so that it was recognised by the government as a Central Technological Institute (Govt. of Bombay, 1923, pp.76-81; Govt. of India, 1968, selections, 1894, pp.109-11).

Most provincial governments undertook an industrial survey in 1889-90, but in most cases the results were not made known. In Bengal, Collin's report (1890) on the industrial survey in the province was not only not formally published, but treated as confidential till 1906. It was only when a question was raised in the Bengal Council in August 1906 that the existence of Collin's report was formally brought to notice (Govt. of Bengal, 1908, p.2). In the report itself it was emphasised that each locality should adopt only such a system of technical education that specially suited its own needs. It was useless to imitate European systems of instruction unless they were modified to suit Indian conditions. The broad outline of the proposals made in the report was, 1) the institution of a mining school, 2) training of mechanical engineers in state railway workshops, 3) providing for training for apprentices and intelligent workmen, 4) the introduction of improved industrial schools, 5) appointment of an inspector to supervise industrial education and 6) that private firms, municipalities and District Boards should be encouraged to open technical schools. But the Bengal Government chose to remain in a state of inaction for more than a decade and a half; and it was after 1906 that a decision was taken to develop only the Sibpur Engineering College and the Calcutta Art School (Ghosh, 1926, p.4).



Earlier, there had actually been a proposal to scale down the activities of the Sibpur engineering workshops. While private institutions like the V.J.T.I. in Bombay were expanding and forging ahead, the Bengal Government was planning to reduce the scale of the Sibpur Workshops. Reacting to this, Alfred Croft, the D.P.I. in Bengal had written, 'The abolition of the workshops at Sibpur is ... a proposal I view with grave misgiving ... Mr. Spring has pointed out that the theory of steam engine...should go hand in hand with practical instruction and that the principles of the utilization of heat of which engineer students have been found to have an imperfect grasp, should be regularly illustrated by tests and experiments on engines actually at work in the shops'. The Government of India ultimately agreed with the arguments of the Bengal D.P.I. and the proposal for contraction of the Sibpur works was given up. (Govt. of India, 1968, Selections 1890, pp.91-92).

Developments in the N.W.P. and in a few other places in northern India were somewhat more encouraging around this time. There were proposals to start an engineering faculty at the University of Allahabad and the setting up of the Jubilee School of Art and Industry at Lucknow (pp.89-90). A survey of the conditions of technical education found that as a result of practical training received at large railway workshops at Allahabad, Lucknow and Lahore, and at Government workshops at Roorkee, Indians had been able to set up, without any European supervision, 17 foundries and mechanical shops in Delhi, one of them with a 20 horse power engine, a small foundry and shop, also under Indian management at Roorkee and two foundries and shops run by Indians at Meerut. The



climate for industrial development and the spread of technical education was found to be not so favourable in provinces like Assam, Burma and the Central Provinces (pp.112-13).

The next important step in the direction of advancement of technical education and industrial training was when E.C. Buck undertook a tour of different provinces of British India from 1898 to 1900 and his report was submitted in 1901. The results of his enquiries were considered at the Education Conference in Simla in 1901. It was accepted that industrial schools were necessary, but before entering such schools pupils should be 'grounded in the three R's, that technical education should follow, and not precede a certain amount of general education'. The principles that were accepted were that industrial schools should be devised to encourage particular local industries or trades. In country districts they should be devoted to the study and development of single indigenous products, in towns and larger centres they should deal with manufactures. The scheme of encouraging country industries was discussed under five heads : 1) encouragement and improvement of Indian art industries, 2) encouragement and improvement of other existing industries, 3) establishment of new industries to compete with imports, 4) encouragement of exports, and 5) creation of central departments of investigation and direction (Govt. of India, 1968, Selections, 1901, p.120). In order to develop country industries, emphasis should be given on training children of the artisan classes, it was felt. The 'fact that the development of machinery and the spread of the factory system had curtailed home industries, and had thus deprived large numbers of children of natural opportunities of learning how to use their hands in the various



occupations once practised in the home' (pp.122-23) was an unfortunate development about which something had to be done.

In the second part of his report, Buck suggested that for the new import substitution type of industries, technical officers should draw up lists of commodities which could be manufactured in this country. Custom house schedules could provide the statistics for imports which met the need of the population of the country and in this manner the demand for goods of different kinds could be estimated. Umbrellas, which were being imported extensively were also being manufactured after a fashion in Calcutta and elsewhere. Much improvement was possible in this field under expert guidance. Locks, travelling boxes, lamps, mirrors and spectacles were similar other examples. In none of these manufactures had the local artisans received expert instruction and guidance, and consequently, without adequate tools or knowledge of the most effective processes were unable to compete with imports from Europe. As Chatterton had pointed out before, there were two advantages in industrial production in India - cheapness of labour and dexterity in manipulation among workmen. Buck was of the opinion that full advantage should be taken of this in producing new items of manufacture like production of scientific and mathematical instruments under expert supervision. This type of work had first been tried out at the Survey Department in Calcutta and then at the Roorkee College as well as at Canning College, Lucknow and the instruments that had been turned out were said to be as good as imported articles supplied by the best European firms. These instruments had just started being manufactured in the bazars. If wood was one of the components of manufacture, then there was a noticeable



advantage of Indian goods over foreign manufactures in that the objects could stand alterations in temperature better. Spokes of carriage wheels imported from England, however well the wood had been seasoned were found to shrink and rattle much more quickly than those in wheels constructed in India. This had been borne out by the experience in the Egyptian war as well when gun carriages made at Fatehgarh stood the dry heat much better than wheels brought from England. Another case in point was photographic cameras. Other areas of special skill where technological schools of applied science could provide guidance were electroplating, lens grinding, gliding, nickel-plating, x-ray making, etc.

Supplying for the needs of the bulk of the population as a rule did not involve considerable expenditure beyond employing the services of a few experts. In such cases where material had to be purchased from abroad, advances could be given to the artisans in initial stages. For industries which needed a large initial outlay, the government could come forward itself or subsidize private enterprise as it had done with large army or police contracts, in the past. In this way the manufacture of tea, leather, woollen fabrics, tents, sugar, rum, beer, soap, brushes and aluminium had been successfully established. The government itself undertook initial experiment in the case of tea, leather and aluminium. In this way some of the most crucial needs of the country could be met which at the time depended on foreign manufactures. (Govt. of India, 1968, Selections, 1901, pp.181-86).

The government could not play such an active role in encouraging exports. Buck pointed out that art fabrics and other artware had great possibilities in European and American



markets, specially the latter (pp.186-91). In connection with export promotion, Buck's report described extensively the activities of Tellery, 'the most important trader abroad for Indian handmade products', dealing with classes of goods 'not usually taken up by Parsis in foreign trade'. Tellery had first been brought over to teach Jaipur artisans how to cut garnets by an army doctor and since then he had expanded in the line of foreign trade, exporting Indian art fabrics and other artware. The government gave him a grant of Rs.10000 to assist him to represent India at the Chicago Exhibition, but this sum of money was obviously inadequate and according to Buck, Tellery incurred a heavy loss. Nevertheless, Buck maintained, Tellery's enterprise was good advertisement and was useful in establishing links with American dealers.

The report also suggested certain concrete measures in quality control and in listing and docketing art products from industrial and country trade schools and then to have them represented at local, imperial and international levels in different emporia or museums. Tellery, who had agents studying markets abroad, received indents for fabrics, plain, or of European patterns and colours, according to the current demand. This section of the export industry, it was argued, gave employment to a large number of artisans and deserved state encouragement. Some of the progress made in official efforts at improving artisanal skill included the promotion of a preparatory school for boys to be employed in mills and factories in Kanpur which was conducted on the kindergarten principles of hand, eye and manual training. In Lucknow, the industrial school gave instruction on improved methods of production both to children of artisans and adult workmen.



A report of the committee on industrial schools was submitted in 1901. A Government of India resolution (No.31 Education Dept. - 20 - 14 January 1904) reviewed the findings of the committee and expressed its disagreement with it. The report of the committee had suggested the abolition of industrial schools and the introduction of a system of supervision over workshops by suitable official agencies. The Government of India, however, felt otherwise and suggested a scheme for industrial instruction in which the basic aims would be, a) keeping up and developing a boy's inherited manual skill and b) giving him a general education which would enlarge his prospects as a craftsman. This might be achieved by starting part time industrial primary and higher primary schools in selected places (Govt. of India, 1968, Selections, 1904, pp.222-32).

### III

In 1904, ten state scholarships for engineers and technicians to go abroad for higher studies or advanced training were instituted. In the same year, an association 'for the advancement of scientific and industrial education of Indians' was established in Calcutta with financial support from leading men in Bengal and a few European subscribers (Govt. of Bengal, p.13). Instances of bleak opportunities in the job market for Indians returning with technical qualifications from abroad have been cited before, in Madras, for example, in the early 1920s (Bagchi, 1972, p.56). In Bengal, out of the 15 stipend holders who had been sent abroad by the association, and who had returned to India in 1908, we get the following descriptions from J.G. Cumming's report



(Govt. of Bengal, 1908, pp.13-14) : 'K.C. Nandi, B.A., B.E., studied electrical engineering in England. It is unfortunate that he has not been able to put his special training to any account as he is now the district engineer at Bogra'. 'G.C. Sen, M.A., B.L., F.C.S., returned after training in dyeing in Leeds and in Germany. He proposed to work with a new joint stock firm called the Bengal Dye Works, Ltd. But negotiations fell through as some members of the syndicate wished to run the concern as a branch of Bengal Lakshmi Cotton Mills. G.C. Sen is still without employment'.

Technicians who had been trained in Japan found it more difficult to secure employment than others, at that time. As many as four of them were still unemployed. But A.P. Ghosh and P.C. Ray who had studied match manufacturing in Japan had been employed in the Bande Mataram Match Factory financed largely by Rash Behari Ghosh. The establishment of the Bengal Technical Institute in August 1906 and the technical department of the Bengal National College of the National Council of Education, Bengal, in July 1907 were some other important developments in the wake of the swadeshi movement in Bengal. Apart from such stray developments, nothing much was achieved in Bengal from the last decade of the nineteenth century to the pre-World War I period. The report of the Bengal Industrial Survey was not only not published but kept confidential even from senior administrators and technical experts for many years. There was also no sanction for the post of inspector of Industrial Schools in Bengal long after it had been approved of in Bombay and Madras. Apart from the railway workshops at Kanchrapara, Jamalpur and Kharagpur, no other



important works where apprentices were trained had come up. Some industrial schools, of course, had been set up in the different districts of the Presidency (i.e. in Bengal, Bihar and Orissa) by the local boards, but only the industrial school at Ranchi, a government institution was successful to any extent.

Apart from Madras, the province which showed some initiative in developing technical and industrial education in relation to the economic needs of the locality was the United Province from 1907 onwards. In a letter to the Home Secretary, Government of India, the U.P. Government Secretary (Nainital, 7 September, 1907) wrote, in connection with the industrial conference at Nainital in that year that there was scope for setting up a special department for industrial enquiries and education. This body could advise the government where and when to take legitimate action in pioneering new industries and giving assistance to decaying industries (Govt. of India, 1968, Selections, 1907, pp.233-45). In this context, various schemes regarding the setting up of a technological institute at Kanpur, the development of the Roorkee Engineering College, improvements in the Lucknow Industrial School, establishment of new industrial schools, etc., were discussed. It was further suggested that proposals for the promotion and improvement of handloom cotton weaving industry, establishment of a school of industrial design, a school for chrome leather tanning devoted to manufacture of agricultural requirements, a school of carpentry at Bareilly and attachment of classes for learning glass-blowing at the Rajpur factory should also be taken up and that technical experts should be given the right of private practice.



In the resolutions passed at the Nainital Industrial Conference on 31 August, 1907 (pp.252-62) it was recommended that a special department was to be set up to deal with industrial questions and to exercise control over technical education. This department was to be headed by a Director of Industrial Enquiries and Education, who was also to preside over the Technological Institute at Kanpur. The Central Technological Institute for U.P. was to consist of two branches—the engineering branch at Roorkee and the chemical branch at Kanpur. The subjects allotted to Roorkee were civil, hydraulic, mechanical and electrical engineering, chemistry, physics, mathematics and mechanics. The Kanpur Institute was to deal with chemistry of sugar, leather, general applied chemistry (acid and alkali), dyeing, bleaching, colouring and printing. There were also some special recommendations about particular industries like tobacco, oil mills, ironworks, turpentine, button-making, etc.

To sum up the main trends in the development of technical education in India before the First World War, it might be said that the tendency in Bengal and in Bombay was to promote technical education by increasing the scope and efficiency of central institutions. While in Bombay this resulted, to some extent in the broadening of the base of technical education, in Bengal, the creation of a top heavy structure was the main problem. In Bengal, local manufactures had to compete with imports, but the position was not identical in every province of British India. In Madras, the government attempted to promote a few industries preceding the introduction of industrial schools. This was because Madras had few



indigenous industries at that time and government action in pioneering industries was not in competition with existing local enterprise. In U.P. on the other hand, a natural protective barrier of seven to eight hundred miles of railway freight charges from the seaboard tended to encourage manufacture and the creation of new manufacturing capacity in preference to purely commercial activity.

#### IV

A.G. Clow, Member of the Viceroy's Council (industry) has left a detailed account of state action in relation to industry under the reformed Constitution of 1919 (Clow, 1928). In the historical introduction to this monograph he tried to analyse some of the developments in the pre-First World War period in the light of some policy decisions that emanated from the imperial capital through the orders of the Secretary of State for India.

Nationalist politics in India had mounted continuous pressure on the government to take positive steps towards industrial and technological advance from around 1905-1908, but the cooperation of the government was not easily secured until after the outbreak of the war. There were exceptions in the form of isolated efforts by individual administrators or departments in one or two provinces. In Madras, Chatterton had been successful in promoting an aluminium hollow-ware industry under government sponsorship between 1898 and 1903, with consent reluctantly given by the Government of India and the Secretary of State (Clow, 1928, p.2). More striking was



the progress of the chrome leather tanning industry in the province. In 1905 again, Morley, the Secretary of State, after expressing his scepticism quite plainly (p.3) sanctioned the Madras Government's proposal for setting up an Industries Department in the presidency which came into existence in 1906.

The year before a separate Department of Commerce and Industry had been created for the Government of India. As mentioned earlier, there was an industrial conference at Nainital in 1907 to examine possibilities of promoting industries in U.P. through state action and to create links between technical education and development of industries in the province. The result was, of course, the creation of a separate department under a Director of Industrial Enquiries and Education. In 1908 and 1909, similar proposals were drawn up at the industrial conferences held at Ootacamund, Madras and Dacca. In 1908 the Madras Government appointed a Director of Industries to take control of pioneer enterprises and industrial education and to establish an industrial intelligence bureau and an industrial museum. In the United Provinces a successful industrial exhibition was held at Allahabad and grants were given to several enterprises (p.4). These included the establishment of an experimental cotton-seed oil factory at Kanpur, managed by a private firm on behalf of the government and a substantial loan given for starting a sugar factory, among others.

The progression of such developments was suddenly arrested in 1910 with a published despatch from Morley, the Secretary of State. The orders contained in that despatch resulted in the abolition of the Department of Industries as



a separate department in Madras. The tanning factory had been transferred earlier to private ownership, a weaving factory was closed after the receipt of the order. In the United Province also, the cotton-seed oil factory was shut down, 'and there was, for a time, a distinct check to official activities in similar directions elsewhere'. (p.5).

In the United Province, the post of the new officer was not abolished, but the officer was made answerable to the Education Department for his activities in supervising industrial schools. For Madras, Morley's instructions were that the officer responsible for industrial education 'should be made subordinate to the Director of Public Instruction.' (p.7). In this way, for some time after 1910, technical education was regarded as a subordinate branch of general education and was entrusted to conventional education authorities. 'They naturally concentrated on the literary type of education in which they possessed expert knowledge, and even when they realized the importance of technical education, their complete unfamiliarity with the needs of industry and the methods that should have been adopted made it almost impossible for them to guide the movement along practical lines'. (p.6).

Eight years later, the Montagu Chelmsford Report made the following remarks. Identifying the 'uneven distribution of educational advance' as one of the major obstacles to the country's general progress it sought to point out an important mitigating factor for failure of the government's education policy. '...it is only of late years and as part of the remarkable awakening of national self-consciousness, that the complaint has been heard that the system has failed to train



Indians for practical work in manufactures, commerce, and the application of science to industrial life ... But it must be remembered that many of the particular classes which eagerly sought higher education demanded also that it should be of a literary character, and were hereditarily averse from, if not disdainful of, anything that savoured of manual toil; and also that when the universities of India were founded the idea of scientific and technological instruction had not dawned upon universities in England.' (Govt. of India, 1918, para 182, pp.119-20). Such contradictory statements, orders or instructions, explanations or insinuations from the same seat of power, at the very centre of the empire, within a decade might be confusing at first sight. But when one tries to examine the different pressures and pulls which segments of the various imperial subsystems were trying to exert, or being themselves subjected to, then such contradictions at the very top of the imperial structure take on a different meaning.

For, among such segments of the different imperial subsystems were included not only the ruling groups, bureaucrats and private entrepreneurs belonging to the ruling country, both in the metropolis and in the colony, but also different classes of people in the subject country, some of whom were more articulate or influential than others. At the same time negotiations with such diverse groups or subgroups could not be allowed to override the fundamental aims or interests of the imperial order in a very broad sense.

According to the recommendations of the Report of the Industrial Commission (1918), the main activities of the government in relation to industries in the country were to consist of directing or initiating industrial research,



promoting industrial and technical education, providing commercial and industrial intelligence, giving financial and technical assistance to different industries and purchasing Indian industrial products for government stores. The machinery which was proposed to be set up for this task included central and provincial departments of industries, manned largely -- by all India technical and scientific services (Govt. of India, 1928, p.11).

The Industrial Commission had been set up before the declaration granting the right of self-government to India in 1917 and its report was finalised before the report on constitutional reforms by Montagu and Chelmsford. This latter report contained a definite affirmation of the principles laid down in the Industrial Commission report. The development of arts and crafts and local industry was put down as a provincial subject. Technical education was put in the same category. Discussing the Industrial Commission's report, Charles Innes, then Director of Industries, Madras, wrote [Correspondence relating to Industrial Commission's report, Commerce and Industries Department, November 1919 (Govt. of India, 1928, pp.19-20)]. 'It must be clear to any one ... that ...it (the report) is centralizing in tendency ... I do not think that it is possible to square the proposals of the Commission with the second of the four formulae laid down in paras 188-191 of the Reform report ... we have two antagonistic forces at work. The Commission is concerned solely with India's industrial deficiencies ... The reform scheme, on the other hand ... is prepared to sacrifice efficiency to other and wider considerations. Hence the one scheme hinges on centralization and efficiency, the other on decentralization even at the expense of efficiency.' Much was made at that time and



subsequently about the slowing down of industrial development and technological progress because of the reforms of 1919 and provincial autonomy. However, more serious reasons for sacrificing development programmes were the financial stringency which made the government adopt retrenchment economies and its deflationary policy in the 1920s which were further accentuated in the depression and post-depression years.

Industrial development and the spread of technical education was quite satisfactory at least in Bombay through this period. As early as in 1912, the Atkinson and Dawson Committee reported that opportunities for employment of technically trained Indians were really quite good in the province. The Visvesvaraya Committee on Technical and Industrial Education in Bombay, 1923, reported in detail not only the work and curricula in higher technical institutions at Poona and the V.J.T.I. in Bombay, but also the excellent level of instruction given in the middle and lower industrial schools throughout the Presidency. Of special interest were the recommendations made for the spread of technical and vocational training for women. As many as 40000 women and girls were sought to be included in the women's mass industrial classes in Bombay Presidency, annually (Govt. of Bombay, 1923, p.133).

One of the notable developments in the field of technical education in the country in the 1920s was the establishment of the Indian School of Mines at Dhanbad in 1926. Upto the end of 1935, 114 students passed out of this institute after training in mining engineering, and most of them were reported to have been able to secure some employment (Govt. of India, 1936, p.8).



No new engineering college was established in the 1920s or 1930s but quite a few changes were introduced in the existing ones. New courses were opened at the MacLagan College of Engineering near Lahore, the Bihar College of Engineering and the Sibpur Engineering College. A department of chemical technology was started by the Bombay University and in 1932 the Jamshedpur Technical Institute modified its training scheme to suit the requirements of the Tata Iron & Steel Company. In 1931 the Imperial Council of Agricultural Research donated a modern sugar factory plant to the sugar technological Institute at Kanpur and in 1935 it was proposed that this institute should become the Imperial Institute of Sugar Research under the direct administration of the I.C.A.R. (Govt. of India, 1936, pp.11-12).

At the level of industrial schools, the government did not start any new institutions except in Punjab, Madras and Bombay. There was some increase in the number of private industrial schools in Punjab (from 23 in 1928 to 34 in 1935), Madras (from 63 in 1928 to 75 in 1935, of which 27 schools were for girls), Bengal (from 63 in 1928 to 76 in 1935). In Bihar and Orissa the number of such schools remained stationary, while there was actually a decline in the number of such schools in U.P., Assam and Burma during the period of economic depression (pp.12-13).

Provincial governments sometimes gave stipends for technical or industrial training in important institutions like the Indian Institute of Science, Bangalore, the V.J.T.I. at Bombay or the Harcourt Butler Technological Institute at Kanpur, specially for pupils from backward communities. More interesting was the official attempt to attract children



from the artisan classes to government schools. In 1928 a mochi (cobblers') class was started at Jabbalpur and then transferred to Nagpur in 1931. Training was given here in shoe and boot making, but as the institution failed to attract chamar boys, government had to sanction 15 stipends of three years' duration increasing annually by one rupee, from Rs.7/- to Rs.9/-. This was done in 1934 and all the classes were seen to be conducted at full strength.

A new system of substituting wage stipends in place of stipends and scholarships was tried by the U.P. government in the carpentry school at Dehra Dun. Similar experiments were also tried at a model weaving school in Mau in Azamgarh District and at the Metal Working School in Aligarh. Tailoring classes were opened by the C.P. Government in 1930 at Jabbalpur and Akola (p.16).

Stipends had been granted in government industrial schools to boys of the artisan class in Punjab upto 1931 in order to compensate their families, at least partially, for the loss of earnings because of their absence from home and also to enable these boys to complete their course of training. In 1931 the number of stipends was drastically reduced and their value was also scaled down. Apart from the need to reduce public expenditure at a time of economic depression, government was also inclined to the view 'that boys and parents would appreciate more fully their technical education and will serve to obtain the utmost benefit from it if they were called upon to make some financial sacrifice to obtain it'. (p.17).



From September 1929 India was plunged into a world trade depression. Under the impact of the depression, the revenue income of the Indian Government fell by Rs.20 cores from 1929/30 to 1933/34. The response of the government to this loss in income was to reduce expenditure under all heads except that of 'law and order'. The most drastic cuts made in public expenditure included the medical and public health services, education (including technical education), public works, civil administration and ordnance production. In order to maintain its payment obligations to England in sterling currency, the Indian Government was obliged to contract currency and follow a deflationary policy. It was also not allowed to devalue its currency, when other countries were doing it, and this affected the exports from the country adversely, specially in trade with non-Empire countries. The government, when it should have raised funds for constructive, or at least infrastructural investment, chose to reduce total public debt by about Rs.92 cores in five years from 1931/32 to 1936/37. It also greatly reduced expenditure on irrigation projects and even ongoing public works (Mukherji, 1989). Under such circumstances, advance in technical training and industrial instruction was surely not on the agenda.

With the outbreak of the Second World War, there was increase in defence expenditure and production and a general rise in the level of industrial activities, but it was not reflected in any significant new developments in technical education or industrial training. In November 1941 the Government of Assam pressed for a discussion by the Central Advisory Board of Education in India of the question of the coordination of the Departments of Education and Industries



in regard to the promotion of technical and industrial education along with general education. In doing so, the Assam Government referred to the need for the development of technical education in relation to the process of industrialization which had been stimulated by India's contribution to the war effort. The Central Advisory Board of Education responded to this in 1942 by saying 'that if overlapping and waste were to be avoided, all types of Technical Education, using the word in its broadest sense, should in all provinces be under the direct control of the Department of Education ... in view of the industrial developments which may be anticipated after the war ...' (Govt. of India, 1943, p.22). The report of the Industrial Research Planning Committee of the Council of Scientific and Industrial Research (Govt. of India, 1945a) and the Proceedings of the Board of Scientific Industrial Research (Govt. of India, 1945b) were both looking ahead towards future planning of science and industrial research in the country, but that episode belongs to developments in the post-colonial period of Indian history.



## REFERENCES

1. Ambirajan, S (forthcoming), 'The Content of Science and Technology Education in South India During the Colonial Period' in R. Macleod & D. Kumar eds.) ....
2. Bagchi, A.K. (1972), Private Investment in India, 1900-1939 (Cambridge).
3. Crane, R. (1966), 'Technical Education and Economic Development in India' in C.A. Anderson & M.J. Bowman (eds.) Education and Economic Development (London).
4. Ghosh, J.C. (1926), Technical Education (Calcutta).
5. Government of Bengal (1908), Technical and Industrial Instruction in Bengal, Part 1 of Special Report by J.G. Cumming (Calcutta).
6. Government of Bombay (1923), Technical and Industrial Education in Bombay Presidency : Final Report, 1921-22 by M. Visvesvaraya et al (Bombay).
7. Government of India (1918), Report on Indian Constitutional Reforms. (Calcutta).
8. Government of India (1928), The State and Industry by A.G. Clow (Calcutta).
9. Government of India (1936), Bulletins of Indian Industries and Labour No. 57 : State Action in Respect of Industries by N. Mahadeva Ayyar (Simla).
10. Government of India (1943), Technical Education Committee Report : Preliminary Report by John Sargent et al (Simla).
11. Government of India (1945a), C.S.I.R., Report of the Industrial Research Planning Committee (Delhi).
12. Government of India (1945b), Proceedings of the Board of Scientific Industrial Research (Delhi).
13. Government of India (1968), National Archives of India, Selections from Educational Records of the Government of India, Vol. IV, Technical Education in India 1886-1907 by K.D. Bhargava (ed.) (New Delhi).
14. Mayhew, A. (1926), The Education of India (London).



15. Mayhew, A. (1938), Education in the Colonial Empire (London).
16. Mukherji, S. (1989), 'Money and Credit in India, 1918-1947', Unpublished paper presented at a seminar on Economic and Social History of India Under Colonial Rule in Jawaharlal Nehru University, New Delhi, March 5 and 6, 1989.
17. Sanyal, H. (1984), 'Traditional Structure of Education in Bengal in the Pre-British Period' Unpublished m.s. of a seminar lecture given at the History Department, University of Calcutta, February 20, 1984.
18. Sen, A. (1977), Iswarchandra Vidyasaqar and His Elusive Milestones (Calcutta).
19. Siddhanta, R. (1965, 1978 edition), 'Education' in V.B. Singh (ed.) Economic History of India 1857-1956. (New Delhi).



db.

17.

18.

19.

1.

2.

3.

4.

5.