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**Government of Bengal**

**Commerce, Labour and Industries Department**

**Report of the Technical and  
Industrial Education  
Committee**

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# REPORT OF THE BENGAL TECHNICAL AND INDUSTRIAL EDUCATION COMMITTEE

Pages

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# Report of the Technical and Industrial Education Committee

## CHAPTER I

### Introduction

1. **Appointment of the Committee.**—By Government Resolution No. 13171-Ind., dated the 2nd December, 1943, the Committee was appointed with the following personnel:—

Mr F. Rahman, M A., B.L., M.L.A., *Chairman.*

#### *Members.*

- (1) Dr. P. N. Ghosh, Ph.D., sc.D., Head of the Department of Applied Physics, University College of Science, Calcutta University.
- (2) Dr. H L Roy, M.I chem.E., A.B. (Harvard), Dr ing. (Berlin), Jadavpur College of Engineering and Technology.
- (3) Dr. Muhammed Quadrat-i-Khuda, D.sc., Professor of Chemistry, Presidency College, Calcutta.
- (4) Dr A. H. Pandya, sc.D. (Eng.), A M.I. (Struct.) E., A.M AM.SOC.C.E., A.M.(Inst)W, M I E (Ind.), Principal, Bengal Engineering College.
- (5) Rai Bahadur J M. Sen, B.sc. (Cal), M Ed (Leeds), Principal, Krishnagar College.
- (6) Dr. J. N. Mukherjee, D.sc, Professor of Physical Chemistry, University College of Science and Technology, Calcutta
- (7) Mr. S. C Mitter, B sc (Eng.), London, A M I.E. (Ind), Director of Industries, Bengal.

Mr. D N. Ghose, M.A., *Secretary.*

At a later stage Mr C. V. Miller, B sc. (Lond.), A M.I (Struct), Officiating Principal of the Bengal Engineering College, was appointed as an additional member of the Committee, while Dr A. H. Pandya who had in the meantime joined India Government in the Department of Supply, first as Director of Metals and then became Deputy Director-General of Munitions Production, continued to be a member in his personal capacity. In October, 1944, Mr. S C Mitter, Director of Industries, also joined India Government in the Department of Supply as Deputy Director-General of Production and so Dr. A. Karim, Ph D., his successor as Director of Industries became a member in his place. But Mr. Mitter in his capacity as Industrial Adviser to Bengal Government was appointed an additional member of the Committee.

2. **Terms of Reference to the Committee.**—Terms of Reference to the Committee were as follows:—

- (i) To enquire into the present state of technical and industrial education in Bengal with reference to—
  - (a) higher technical education as imparted in the colleges associated with the Universities of Bengal or in other institutions;
  - (b) vocational and technical education as imparted in Railway Technical Schools, the Calcutta Technical School and other such schools;
  - (c) artisan training as imparted in the Technical Schools under the Department of Industries or under private management;
  - (d) any other categories of vocational and Technical Schools in Bengal
- (ii) To suggest a comprehensive scheme of industrial and technical education for the province so as to serve the progressive needs of the industries and the people of Bengal.

3. **Previous enquiries.**—Before we describe the procedure of enquiry adopted by the Committee, we consider it necessary to make a reference to the enquiries into technical education that were undertaken under the


**Government of Bengal**  
Commerce, Labour and  
**Industries** Department  
(Industries Branch)

**From** P. Nag, Esq., M. A., B. C. S.,  
Asstt. Secy. to the Govt. of Bengal,  
**To** The Secretary, Servants of India Society, Poona 4, (India)  
No. 1109-Ind., dated Calcutta, the 17th May, 1945.

Sir,

with reference to your letter No.0312, dated the 14th March, 1945 to the address of the Secretary, Education Department of this Government, I am directed to forward herewith a copy of the Report of the Technical and Industrial Education Committee as asked for. As the report is 'for official use only' and has not been released to the Press it is requested that no publicity should be given to it.

I have the honour to be,  
Sir,  
Your most obedient servant,

  
17.5.45  
Assistant Secretary.

L.17.5

17/5

auspices of the Industrial Survey Committee, which form an important background of our present enquiry. The Industrial Survey Committee appointed a small Technical Education Sub-Committee on the 9th June, 1939, to investigate and report on the problems of industrial and technical education in Bengal. The Sub-Committee consisted of the following:—

Mr. Fazlur Ramman, M.A., B.L., M.L.A., *Chairman.*

*Members.*

- (1) Mr. S. C. Mitter, B.Sc. (Eng.), Director of Industries, Bengal.
- (2) Dr. S. K. Mitra, D.Sc., Science College, Calcutta University.

**4. Plan of enquiry by the Sub-Committee.**—At the outset certain issues of outstanding importance concerning technical education in the province were clarified so as to form the basis of the Sub-Committee's programme of enquiry. In respect of large organized industries it was recognized that firstly, a scheme of technical education must, as a constructive practical measure, be attuned to the real needs of industries both existing and potential and that secondly, such a scheme must, to bear the desired results, be based on the active and effective support of the industrialists wherever such support was called for. As there was already a fairly developed organization for technical education in existence in the Province and proposals for certain improvements thereon were afoot, the question naturally arose as to how these would answer to the two requirements just mentioned. Another dominant consideration connected with this enquiry was the necessity for ascertaining how far the organized industries in the province offered opportunities, through proper and adequate facilities of apprenticeship training, to our technically trained young men to rise to responsible positions of supervisory grades of service which are to be considered most important in the present stage of India's industrial development. In accordance with such an approach to the problem of technical education in Bengal, the Sub-Committee decided to enquire into the following points:—

- (a) What openings exist for the employment of technically trained Indians and what further openings are likely to be available?
- (b) What type of men and standard of education and training do employers of labour demand in the various industries?
- (c) Have these demands been met by the existing technical institutions?
- (d) If not, how should these institutions be reorganized in order that they should be in a position to meet these demands?
- (e) What arrangements can be made for systematic co-ordination between institutions and employer of labour, in order that they may co-operate for their mutual benefit and for the good of the country.

Then in respect of small and cottage industries, it was recognized that the problem of technical education involved—

- (a) the training of middle-class young men as entrepreneurs, and
- (b) the training of existing cottage workers in improved methods of production.

It was decided that in order to assess the progress achieved in these two directions, the Director of Industries should be requested to furnish detailed information on the questions involved by (a) and (b) above and also the heads of technical institutions, either under the control of the Department or not, should be approached for furnishing information on the problems connected with the training of cottage workers in the Province.

**5. The procedure of enquiry followed by the Sub-Committee.**—It was decided that specific questionnaires should be addressed to different bodies and persons to elicit detailed information on different aspects and problems

of technical and industrial education in Bengal Accordingly the following questionnaires (vide Appendix I) were issued by the Sub-Committee —

<i>Subjects of Questionnaire.</i>	<i>Parties to whom issued.</i>
(i) Training of cottage workers—	Director of Industries.
(1) A Special Questionnaire regarding training imparted to existing cottage workers and middle-class young men engaged in small industries.	Director of Industries, Collectors, Superintendents of District Technical Schools, Inspector, Technical and Industrial Institutions.
(2) A Special Questionnaire regarding steps taken by the Department to improve the artistic side of industries.	Director of Industries
(ii) Training of workers in large organised industries—	
(a) A Questionnaire regarding	Director of Industries.
(1) proposals of the Department of Industries for providing technical education in regard to metals, textiles, oil, ceramics and tanning; (2) Training required for the recruitment of Indians in the directing and managerial grades of services in large organized industries	
(b) A Questionnaire regarding training of workers in large organized industries.	Chambers of Commerce, Industrial Associations, Secretary, Board of Apprenticeship Training, Inspector, Technical Institutions. Industrial firms not affiliated to the Board of Apprenticeship Training
(c) A special Questionnaire regarding training of mechanical Engineers.	Principal, B. E. College, Superintendent, Jadavpur College of Engineering and Technology.
(d) A special Questionnaire regarding training in technology	Departments of Applied Physics and Chemistry, Calcutta, and Department of Chemistry, Dacca.

A detailed list of the persons and institutions in Bengal and outside Bengal to whom the different questionnaires were issued is furnished in Appendix X.

**6. Discussion with educational experts within the province.**—While replies were received from various parties to the questionnaires issued, the Chairman of the Sub-Committee who is the Chairman of the present Committee also, held discussions on behalf of the Sub-Committee with several educational experts with a view to securing their opinions and suggestions on the various aspects of technical education in Bengal and specially on the various points arising out of the proposals of Mr. J. Sargent, Educational Commissioner (now Adviser) with the Government of India, contained in his note on "Technical Education in Bengal". The names of the gentlemen with whom the Chairman held discussions with the approval of the Sub-Committee may be specially mentioned as follows.—

- (1) Dr. A. H. Pandya, Principal (then), B. E. College, Sibpur
- (2) Mr E. J. Hogben, Principal, Calcutta Technical School
- (3) Dr H. L. Roy, Professor, Jadavpur College of Engineering and Technology

- (4) Mr. J. K. Pal, Head-Master, Kanchrapara Technical School (now deceased).
- (5) Dr. Banerjee Das, Professor of Applied Chemistry, Jadavpur.
- (6) Mr. A. N. Sen, Inspector of Technical and Industrial Institutions, Bengal.
- (7) Mr. B. C. Bhattacharjee, Principal, Serampore Textile Institute.
- (8) Mr. N. N. Sen, Head-Master, Kanchrapara Technical School.
- (9) Dr. B. C. Guha, Head of the Department of Applied Chemistry, Calcutta University.
- (10) Dr. M. N. Goswami, Department of Applied Chemistry, Calcutta University.
- (11) Dr. H. N. Dasgupta, Department of Applied Chemistry, Calcutta University.

**7 Discussions with heads of technical institutions.**—Special questionnaires as mentioned in paragraph 4 above had been issued to the heads of various technical institutions in Bengal. Now with the approval of the Sub-Committee, the Chairman along with the Inspector of Technical Institutions and the Secretary visited the following institutions and discussed with their Heads various questions bearing on their organization, courses of studies, equipments, etc., as also on general problems of technical education of the province.—

- (1) District Board Technical School, Burdwan
- (2) Moberly Technical School, Hooghly.
- (3) Ishapur Technical School
- (4) Bipradas Pal Chowdhury Technical School, Krishnagore.
- (5) Midnapore Weaving School.
- (6) Mograhat Weaving School.
- (7) Santipur Weaving School.
- (8) Ramkrishna Mission Industrial School.
- (9) Baranagore Mission Industrial School.
- (10) Indian Mission Industrial School, Cossipore
- (11) Morapal Mission Industrial School.
- (12) Saroj Nalini Industrial School.
- (13) Vidyasagar Bani Bhaban.
- (14) Calcutta Deaf and Dumb School.
- (15) Indian Bakery and Confectionery College, Bhowanipur.
- (16) Moharaja Cossimbazar Polytechnic Institute
- (17) Bishnupur Industrial School
- (18) Anandapur Weaving Demonstration Party
- (19) Uluberia Coir Demonstration Party.
- (20) Mograhat Brass and Bell-metal Demonstration Party.
- (21) Calcutta Technical School.
- (22) Jadavpur College of Engineering and Technology
- (23) Kanchrapara E. B. Railway Technical School
- (24) Bengal Textile Institute, Serampore

**8 Visits to Institutions in other Provinces.**—Besides, the Chairman accompanied by the Inspector of Technical Institutions and the Secretary visited the undermentioned institutions in other provinces and held discussions with the heads and expert members of the staff thereof—

- (1) U. P. Government Handloom Emporium, Lucknow.
- (2) Government School of Arts and Crafts, Lucknow.
- (3) U. P. Arts and Crafts Emporium, Lucknow
- (4) Government Central Textile Institute, Cawnpore
- (5) Government of India Delhi Polytechnic.
- (6) Dayalbag Industries, Dayalbagh, Agra
- (7) Bareilly Wood Working Institute.
- (8) Dehra Dun Forest Research Institute.
- (9) Bombay Victoria Jubilee Institute.
- (10) Department of Chemical Technology, Bombay University.

- (11) Research Laboratories of the Indian Central Cotton Committee, Bombay
- (12) Harcourt Butler Technological Institute, Cawnpore
- (13) Central Textile Institute, Benares.
- (14) Imperial Institute of Sugar Technology, Cawnpore

9 **Discussions with Mr. J. Sargent, Educational Commissioner (now Adviser) with the Government of India.**—The Chairman met Mr Sargent at New Delhi in the course of his North India tour and also when he was in Calcutta in December, 1941, and discussed with him on both the occasions problems of Bengal's technical education and specially, the question of establishing a Central Technological Institute in Bengal. On the latter occasion Mr Sargent was shown a few possible sites for the proposed Polytechnic in Calcutta and his views were obtained on the various questions connected therewith.

10. **An Interim Report by the Committee.**—In 1941, the Sub-Committee had to submit an Interim Report on the proposed Reorganization of Unemployed Relief Scheme and Demonstration Parties which had been referred to the Sub-Committee for examination and report. The Sub-Committee while examining the proposals went at length into the problems connected with the training of cottage industry workers in Bengal.

11. **Negotiations with various Industrial Associations regarding training of workers and apprentices.**—It was felt that by personal discussions and negotiations with representative industrial associations, it might be possible to evolve suitable schemes of training mill workers and apprentices. With this objective in view, the Chairman was authorised to start negotiations with the Indian Jute Mills Association, and the Indian Engineering Association. These bodies were requested to send their nominees to be associated with the Sub-Committee for the purpose of discussions. Accordingly the Indian Engineering Association and the Indian Jute Mills Association nominated Mr. H. A. Gibson and Mr. J. A. Murray, respectively. The Chairman carried on discussions with these gentlemen and as a result, tentative schemes were formulated to which the nominees of the Associations accorded general approval in their personal capacity. These schemes could not, however, be submitted for approval to their respective Associations, due to the reconstitution of the Industrial Survey Committee in June, 1942, and consequent reconstitution of the Technical Education Sub-Committee. These schemes with modifications have been incorporated in the present Report. The schemes of training cotton textile industries as recommended in the Report had also been referred to the Bengal Cotton Mill Owners' Association and their general approval was secured.

12 **The work of the reconstituted Sub-Committee.**—The reconstituted Sub-Committee started their work on the basis of the materials already collected and the programme that had been tentatively agreed upon by the previous Sub-Committee. Their deliberations were in progress when in July, 1943, again, the Sub-Committee suffered another reconstitution with the result that the progress of work was halted. In November, 1943, the Government decided that since the problems of technical and industrial education are of major importance to the economic progress of the province and form a major subject of enquiry, an independent Committee of investigation should be constituted to go into the whole question of technical and vocational education in all its aspects. The present Committee, was, therefore, appointed in December, 1943, with Terms of Reference as stated in paragraph 2 above.

13. **Programme of the new Committee.**—The new Committee is, therefore, in a sense a continuation of the old Sub-Committee, although it has no formal affiliation with the Industrial Survey Committee and some of its members were not on any of the old Sub-Committees. All the materials and papers that were collected by the previous Sub-Committees and the views



that were formulated under their auspices have been available to our Committee and we have based our conclusions on a rational sifting of these as well as on such new materials that could be collected in the meantime. Regarding the negotiations with various industrial bodies which were started by the Chairman in order to evolve satisfactory schemes of training, we admit that we should have resumed them and brought them to a conclusive stage, but the time at our disposal was very short and on account of the war time developments, many of the personnel with whom such negotiations were originally started are not now available. Besides, the main principles underlying the schemes tentatively agreed upon by the nominees of the Associations have been incorporated in the present Report. We, therefore, leave the task of resuming negotiations to the Board of Technical Education as proposed by us in the body of our report (*vide* Chapter XIX), for settling outstanding questions bearing on the subject.

**14. Enquiry into commercial education.**—The Sub-Committee of the Industrial Survey Committee did not at any stage undertake an enquiry into the available facilities of commercial education in Bengal on the ground that the Education Department had already set up a Committee of Enquiry for investigating into the reorganization of the Government Commercial Institute and the enquiry covered as many as forty-seven commercial institutions affiliated with the Institute. We are given to understand that this enquiry has been indefinitely abandoned or postponed. The present Committee while admitting the desirability of undertaking an enquiry into commercial education in Bengal, for it forms a necessary part of technical and industrial education of the province, feels that since no spade work has been made in this field, the submission of their main recommendations regarding technical education should not be delayed by the question of Commercial Education which the committee may take up for consideration at a later stage, if Government so decides. It has recently been decided by Government that the committee's term should be extended up to the 28th February, 1945, so that this part of the enquiry may be completed. We have, therefore, decided to submit our present Report on Technical Education and then take up the question of vocational education.

**15. Report of the Central Advisory Board of Education.**—In submitting our report, we should like to mention here that while it was under consideration, the Report of Central Advisory Board of Education was published and made available to us. We have duly considered the proposals contained in the Report.

**15A. Three diagrams furnished.**—We have furnished in the body of the Report three diagrams representing the existing system of technical and industrial education and the system recommended by us. Diagram I indicates the existing system and Diagram II, the proposed system as adjusted to the present system of general education, while Diagram III represents the system as proposed by us when the suggested reforms in the present system of general education (*vide* paragraph 91) are carried out.

**15B. Future developments envisaged.**—We envisage that after our recommendations have been given effect to and the various schemes have been in operation for a reasonable period, post-graduate technological studies and higher researches in institutions like the Central Polytechnic, the Institute of Textile Technology and Engineering Colleges of Sibpur and Jādavpur and also in the Technological Departments of the Universities will be introduced.

**15C. Financial Estimates of Schemes to be submitted later.**—The Committee will submit a separate report on the financial implications of the various schemes proposed, as Part II to this Report.

16. **Acknowledgements.**—We take this opportunity of recording our appreciation of the ready co-operation and assistance which the various industrial and commercial organizations of Bengal and official and non-official educationists belonging to this province and other provinces have rendered to the work of the Committee. We should like to specially mention that Mr A. N. Sen, the outgoing Inspector of Technical and Industrial Institutions, Bengal, and Messrs H. A. Gibson and J. A. Murray nominees of the Indian Engineering Association and the Indian Jute Mills Association, respectively, who were good enough to assist the Committee at different stages of their enquiry with their suggestions. Besides, Mr. J. N. Sengupta, M.B.E., who was secretary of the original Sub-Committee and had to leave the post in February, 1942, for taking up a job in the Government of India ably assisted the Committee at the initial stages of the enquiry and in collecting much useful materials for the Committee's work. We also want to place on record our great appreciation of the work done by Mr. D. N. Ghose, the present secretary, in completing our enquiry.

## CHAPTER II

### The Historical Background of the Existing System of Technical Education

17. **A Planless Educational Policy.**—The progress of technical education is everywhere linked with the evolution of the educational system and the growth of trade and industry. The process receives conscious direction from any deliberate policy that the Government of the country might pursue. In India, however, this has not been the case. From the beginning of the British connection, the Government of India followed a policy of indifference, if not hostility, to the development of industries. In the evolution of the educational system also, no plans to meet the progressive requirements of the nation were formulated or followed in the early years. This is not to suggest that nothing whatever was done, but that the efforts for technical education were either inadequate or sporadic. Nor were the results of such efforts utilized for formulating suitable schemes of technical education to meet the needs of the people and help young men to solve the problem of careers and at the same time lead to the progressive industrial development of the country. There was no planned correlation between general education and technical training. Little was done to ensure the evolution of a suitable system of technical education in the country and *pari passu* the expansion of economic opportunities for the nation as a whole. It may, therefore be stated that till the beginning of the second quarter of the present century, the history of technical education in this country has been almost planless and devoid of any purposive direction.

18. **India's Educational needs not sympathetically assessed.**—In explaining why technical education was undeveloped and did not evolve as rapidly in India as in the European countries, it is suggested that this was mainly because India was economically backward. It assumed that her industrial development did not require a constant supply of specialized technicians as in England since the Industrial Revolution. The explanation seems plausible but leaves unanswered the question whether progress in technical education follows progress in industries or *vice versa* or both can be achieved simultaneously. The educational history of most countries suggests that the evolution of technical education followed the growth of trade and industries there. It is, however, equally clear that the growth of technical education influenced and stimulated the industrial progress of a country at every stage. In the Indian situation, some special factors were present. The growth of industries or the progress of educational facilities here was entirely at the discretion of foreign rulers who had not always assessed the requirements of this country rightly or sympathetically. It would not be far wrong to conclude that with a right policy for the expansion of technical education, the progress of industries here would have been vastly greater and diversified. Equally, a right policy of industrial development would have evolved

a comprehensive system of technical education in this country. We shall later have occasion to refer to the inter-relation of technical education and industrial progress. It is enough to say here that the absence of a planned effort to evolve a system of technical education is the obverse of the unimaginative policy of inactivity with regard to industrial development.

**19. The background of the present system.**—We may now briefly refer to the background of the present system of technical education. The need for technical education was recognised and many discussions and conferences were held from time to time but without any positive and far-reaching results. The report of the Indian Famine Commission pointed out in no uncertain terms the need for providing diversified means of livelihood as the vast majority of Indians were dependent on agriculture alone. In 1882, a Commission was appointed by the Government of India to review the existing system of education in the country and chalk out a suitable educational policy. In defining the scope of enquiry for the Commission, the Government recognised the necessity for technical education, but they were, however, afraid that it might unduly burden the labours of the Commission. About this time, e.g., in 1884, the Report\* of the Royal Commission on Technical Instruction (1881-84) in England was published and created a great interest in India. They attracted attention to the promotion of technical education so that the material resources of the country might be developed and indigenous industries assisted against foreign competition. On June 8, 1888, the Government of India passed a Resolution on the subject of technical education, in which they deplored that educational development in the country was "too exclusively literary in its bent" and recognised the necessity for industrial training with a view to secure a variety of occupations for the people. It was also recognised that "technical education could be provided with advantage at once for industries which had already reached a comparatively advanced stage of development such as the textile and engineering industries", though the danger of establishing a system of training for those insufficiently developed was noted. The need for imparting a more practical bias to general education was also emphasised and Local Governments were asked to take action in these directions. The immediate results of this Resolution were not large or far-reaching; but in so far as it gave public expression to the intentions and ideas of the India Government regarding technical education, it had its result in the years to follow. The Victoria Jubilee Technical Institute was established in 1887 through private efforts. It sought to provide courses of training suited to the requirements of Bombay textile industries. Attempts were also initiated in Madras, though they were ultimately frustrated through the sterile policy adumbrated by the Secretary of State that the Provincial Government should not take any active interest in industrial development. These efforts to establish technical schools in some shape or other in different parts of India were no doubt inspired by the Government of India Resolution of 1888. The consciousness grew that the measures taken by the Education Department for promoting educational facilities were inadequate for meeting the needs of India. There was also increasing recognition of the

\*The Commissioners called attention to the fact that the middle classes in England were at a great disadvantage compared with those of the continent for want of a sufficient number of Secondary Technical Schools. They pointed out "The existing endowments are very unevenly distributed over the country, in many of the large manufacturing centres no resources of the kind exist, private enterprise is clearly inadequate to do all that is required in establishing such schools, and we must look to some public measure to supply this, the greatest defect of our educational system."

On secondary and technical instruction, the Commission made the following specific recommendations —

- (a) That steps be taken to accelerate the application of ancient endowments, under amended schemes, to secondary and technical instruction.
- (b) That provision be made by the Charity Commissioners for the establishment, in suitable localities, of schools or departments of schools, in which the study of natural science, drawing, mathematics and modern languages shall take the place of Latin and Greek."

imperative necessity for widening the range of occupation for the rising generations. In 1901, Lord Curzon convened an Educational Conference at Simla which reviewed the whole position and recommended many changes in the method of higher education, so as to render it more effective and practical. The subject of technical and industrial education also engaged the attention of the Conference

**20. The Simla Conference and After.**—At the Simla Conference of 1901, the following Resolution was adopted regarding technical education:—

“That Technical education in India has hitherto been mainly directed to the higher forms of instruction required to train men—

(a) For the Government service as engineers, mechanicians, electricians, overseers, surveyors, land revenue officers and teachers in schools.

(b) For employment in railway workshops, cotton mills, mines, etc.

That the institutions which have been established for these purposes, such as the engineering college at Rurki, Sibpur, and Madras, the College of Science at Poona, the Technical Institute at Bombay, the Engineering School at Jubbulpore, etc., the majority of which are affiliated to universities and train up to university courses, have done, and are doing valuable work, and that their maintenance and further development are matters of first importance; but that the first call upon technical effort should preferably be in other direction.”

21 The Conference did not result in any great change. This was due to the idea that it lay outside the province of Government to take any part in the industrial development of the country, beyond the provision of facilities of technical education and supply of trade and industrial intelligence. The Conference did not recognize the fact that to produce a class of men of a thoroughly practical turn of mind, it is necessary that the training should begin when the brain is more susceptible to external suggestions. Soon after the Conference, the Government of India appointed a Commission to report on technical education but the Report of the Commission was never published. One positive result of the Conference was, however, the establishment by the Government of India of certain scholarships to enable Indians to proceed to Europe and America for special training. An explanation of the new Government policy with regard to technical education was given in the Government Resolution on Educational Policy, 1904, as follows:—

“Technical education in India has hitherto been mainly directed to the higher forms of instruction required to train men for Government service as engineers, mechanicians, electricians, overseers, surveyors, revenue officers, or teachers in schools, and for employment in railway workshops, cotton-mills and mines. The institutions which have been established for these purposes, such as Engineering Colleges at Roorki, Sibpur and Madras, the College of Science at Poona, the Technical Institute at Bombay, and the Engineering School at Jubbulpur, have done and are doing valuable work, and their maintenance and further development are matters of great importance. The first call for fresh effort is now towards the development of Indian industries, and especially of those in which native capital may be invested. Technical instruction directed to this object must rest upon the basis of a preliminary general education of a simple and practical kind, which should be clearly distinguished from the special teaching that is to be based upon it, and should as a rule be imparted in schools of the ordinary type. In fixing the aim of the technical schools, the supply or expansion of the existing Indian markets is of superior importance to the creation of new export trades, and a clear line should be drawn between educational effort and commercial enterprise. As a step towards providing men qualified to take a leading part in the improvement of Indian industries, the Government of India have determined to give assistance in the form of scholarships to selected students to enable them to pursue a course of technical

education under supervision in Europe or America. They hope that the technical schools of India may in time produce a regular supply of young men qualified to take advantage of such facilities, and that the goodwill and interest of the commercial community may be enlisted in the selection of industries to be studied, in finding the most suitable students for foreign training, and in turning their attainments to practical account upon their return to this country. The experience which has been gained in Japan and Siam of the results of sending young men abroad for study justifies the belief that the system will also be beneficial to Indian trade.

“Industrial schools are intended to train intelligent artisans or develop those local industries which are capable of expansion by the application of improved methods or implements. Schools of this type are not numerous, nor have they at present succeeded in doing much to promote the growth of industries. A recent enumeration gives their total number as 123, with 8,405 pupils in attendance, and the number of different trades taught as 48. Some are conducted by Government, either as separate institutions or attached to schools of art, while others are managed by local authorities, or by private persons under a system of grants-in-aid. A large proportion of the pupils who attend them have no intention of practising the trade they learn, but pass into clerical and other employments, using the industrial schools merely in order to obtain the general education which they could acquire in ordinary schools at less cost to the State, but at greater cost to themselves. Even for those who do intend to follow the trades taught in the industrial schools, it is feared that in some cases the teaching given does not provide a training of a sufficiently high standard to enable them to hold their own with artisans who have learnt their craft in the bazaar. The industries selected are frequently not those which are locally of most importance, and there is an undue predominance of carpentry and blacksmith’s work amongst them.

“An attempt will now be made to remedy these defects. The Government of India do not expect a large immediate increase in the number of industrial schools, and they desire rather to encourage experiment than to prescribe fixed types for this form of education. Admission will be confined to those boys who are known by their caste or occupation to be likely to practise in after life the handicrafts taught in the schools, and the courses of study will be so ordered as not to lend themselves to the manufacture of clerks but to bear exclusively upon carefully selected industries. A distinction will be drawn between those types of schools which will be suitable for the large centres of industry, where capital is invested on a great scale and the need of training artisans is already recognised by the employers, and those adapted to places where hand industries prevail, and where the belief in the value of technical training has yet to make its way. In the former, the prospects are favourable for the establishment of completely equipped trade schools, such as are found in other countries; in the latter search has still to be made for the kind of institution which will take root in Indian soil. Suggestions for experiment based upon observation of the habits and tendencies of Indian artisans have been placed before the Local Governments. They will be pursued further under the advice of skilled experts in particular industries.”

**22 Atkinson-Dawson Enquiry.**—We now come to the next important step taken by the Government of India for the promotion of technical education. This was the institution of the Enquiry in 1912 to bring Technical Institutions into closer touch and more practical relations with the Employers of Labour in India. The enquiry was entrusted to Lieut - Colonel Z. H. Dev Atkinson, R.E., and Tom S. Dawson, Esq. They were deputed by the Government of India to investigate into the following subjects.—

- (a) What openings exist for the employment of technically trained Indians and what further openings are likely to be available?

- (b) What type of men and standard of education and training do employers of labour demand in the various industries?
- (c) Have these demands been met by the existing technical institutions?
- (d) If not, how should these institutions be altered or added to, in order that they should be in a position to meet these demands?
- (e) What arrangements can be made for the systematic co-ordination between institutes and employers of labour, in order that they may work with each other for their mutual benefit and for the good of the country?

**23. Recommendations of the Committee.**—The main recommendations of the Committee may be summarised as follows.—

- (i) The existing system of training for the Civil Engineering Profession in Central Colleges is the most suitable one for the requirements of India
- (ii) Apprenticeship for one year on practical work in the Public Works Department should be granted, if possible, to every student passing out of a Civil Engineering College.
- (iii) There is practically no opening at present for the employment of high grade mechanical or electrical engineers whose education is mostly of a theoretical character.
- (iv) There is a very large opening for the employment of men in mechanical and electrical engineering, who after training in properly equipped Institutes, are willing to gain practical experience by apprenticeship on a living wage, to work with their hands, and observe factory hours and rules. This employment is open to Indians of every caste or creed, every grade of social position or education, provided these conditions are observed, and the height to which they can rise depends on their individual characteristics.
- (v) The best method of training men in mechanical and electrical engineering to meet the existing demand is by a course at a well-equipped Institute, followed by an apprenticeship in works. Institutes should not grant any certificates till this apprenticeship is satisfactorily completed.
- (vi) The education given in the Institute should be essentially practical; be capable of being applied commercially, and not of such a scientific character as is often considered necessary in the West.
- (vii) Large mechanical and electrical Institutes are, at present, only necessary in those Provinces in which industrial development is well advanced. Minor Institutes should be properly endowed, equipped with adequate staff and apparatus, and placed under proper control as regards their courses and certificates.
- (viii) The staff of all Institutes should be carefully selected, and consist of men with the necessary theoretical attainments and extensive practical experience. To keep in touch with the various industries, the staff should be permitted to take up consulting and advisory work as opportunity offers.
- (ix) Apprenticeship after a course at the Institute as detailed in recommendations (iv) and (v) are equally necessary for technical education in the textile industry, in which the courses in spinning and weaving should be separate ones.
- (x) Afternoon classes for textile jobbers and mistriis should, if possible, be instituted in suitable centres, if a satisfactory demand exists, to give practical demonstrations in the vernacular in the theoretical side of their work.
- (xi) Arrangements should be made for the permanent co-ordination of the relations between institutions and employers of labour by the appointment of a controlling officer, and the establishment of an employment bureau.

**24 Limitations of the Findings.**—On an analysis of the detailed recommendations of the Committee, it becomes evident that although the terms of reference were on the whole comprehensive, the findings were limited in many respects. The enquiry instituted by the Committee suffered from several defects. With regard to item (c) in the Terms of Reference the Committee did not undertake adequate investigation to get at reliable information and data for framing an authoritative conclusion. With regard to item (d), the Committee did not go into the basic principles of technical education nor thrash out the issues in so far as they related to Indian conditions and requirements. With regard to the last item, the Committee did not suggest any comprehensive proposal but only expressed certain hopes without caring whether they were realizable through the machinery proposed by them. Besides, the whole enquiry was coloured by the same theoretical bias which had characterised all previous Government attempts for the promotion of technical education in this country. The Committee also suffered from the prejudice that as the country was not industrially well-advanced, progress of technical education could not be expected in India to the extent or on the lines of the educational advances in other countries. The Committee suggested—

“If it is admitted that in every other country technical education has followed the organisation of industries or grown up alongside with them, and may be said to be the necessary complement to industrial efficiency, it is obvious that in a country where few industries are established, the wholesale education of Indians could only result in an excess of young men trained up for posts which do not exist, and for whom no suitable occupation can be found.”

This is a conclusion with which we cannot agree. Even at the time when the Report was prepared, opportunities were not so few as suggested. Many non-Indians held high technical posts in the existing industries which could have as well been held by Indians, had they received the requisite technical training. The real fact was that although there were capable Indians willing to learn and serve, opportunities of training and of proving their worth were denied to them. The Committee with an appearance of sympathy for the Indian boys goes on to suggest—

“The question whether technical education is of any assistance at all depends, firstly, on the general aptitude of the subject for this line of work. It is useless training a man in mechanical engineering who will not take off his coat and work, whose physique will not stand the strain, or whose social customs make manual work repugnant. Secondly, the question depends on the general business aptitude and energy of the race, whether capital and commercial confidence is forthcoming to start enterprises and perseverance and grit in the application of technical knowledge to ensure a successful outcome for these ventures. Captains of industry are not turned out mechanically in technical institutions, and every technically trained student must be prepared to start on the lowest rung of the ladder, show his superiority by hard work and technical knowledge and having made himself indispensable and a commercial asset to his employer, he will then rise by the natural laws of supply and demand.”

25. The qualifications of a successful technician as stated above are unexceptionable. What is objectionable is the veiled reflection on the ability of Indian boys to adjust themselves to the conditions and discipline of technical education. The insinuation is neither justified nor relevant. It is beyond question that the supposed technical inability of Indian boys was due not to any innate defect of character or outlook but to the Governments' unsympathetic treatment of the industries and its lack of a constructive policy.

**26. Recommendations of Industrial Commission, 1916-18.**—The needs of technical education in this country were next examined by the Indian Industrial Commission appointed in 1916, by the Government of India. The

Commission went very carefully into the existing system of technical education, surveyed its defects and requirements and made certain important recommendations which may be summed up as follows —

- (1) Industrial schools should be controlled by the Departments of Industries. Their head-masters must possess practical skill in the industries taught and knowledge of their economic conditions. These schools are a means of suitable training for cottage, but not for organised, industries
- (2) Organised industries may be divided into two classes, manipulative, such as mechanical engineering, and non-manipulative or operative, such as the manufacture of chemicals. Training for manipulative industries should be given in the works themselves, to which theoretical classes should be attached. There are certain cases where the individual concerns are not large enough for this; these can sometimes be conveniently dealt with by central teaching institutions serving a group of works; but where such arrangement is impossible, and in case of textile trade where the preliminary training can best be given in a school, instructions may be more conveniently provided in practical schools with workshops or instructional factories attached
- (3) In the case of non-manipulative industries the necessary training can usually be given in a teaching institution, but practical experience is needed, if the student is to rise in his profession. In these industries the instruction should be mainly technological e.g., in a branch of applied chemistry, with some training in engineering, and can be given in a teaching institution. The necessary practical experience must be gained in the factory, in which the student's technological training will qualify him at once for employment. At the large engineering shops practical training should be given to artisan apprentices on an organised system, with teaching in shop-hours; and the apprentices should be paid wages, a part of which they might receive in the form of deferred pay on leaving.
- (4) In the case of foreman a system of apprenticeship on conditions that should attract middle class Indian youths is suggested, with teaching in shop-hours of a more advanced type than in the case of artisan apprentices and providing for boys who would start at a somewhat higher age.
- (5) In the case of mechanical engineers also, the large engineering shops should be used as the practical training ground, but a greater proportion of the time should be devoted to theoretical teaching of a higher kind than is necessary for foremen. Those students who desire it may, after completing their shop training, take courses in special subjects at an engineering college.
- (6) The engineering colleges should, as soon as is practicable, make over the training of subordinates to lower grade institutions, and should add departments for technological training. These colleges should be administered by councils, on which the University, the Department of Industries, and employers should be represented, while the Council should have the privilege of electing a certain number of its members to represent it on the University Senate. The Universities would decide which of the college courses should qualify students to sit for a degree. In addition to the existing provincial institutions, two imperial colleges seem likely to be needed ultimately, one for the highest grade teaching of engineering, and the other for metallurgy and mineral technology.



- (7) As regards mining, the evening classes on the coal fields should be retained and improved; and the scheme put forward for a school of mines at Dhanbad is preferable to the present arrangements at Sibpur and should be improved.
- (8) In respect of commercial education it is of the utmost importance to secure the co-operation of commercial men. Commercial colleges should be administered by Councils consisting largely of business men with representatives of the Universities; these Councils should also elect from among their members delegates to the University Senates. The Universities should retain the right to prescribe which courses of the colleges shall qualify a student to sit for a University degree.
- (9) All industrial and technical institutions of less than collegiate rank should be controlled by the Department of Industries, though the advice and co-operation of the Department of Education is desirable.

27. **Negative results of a laissez-faire policy.**—The Government of India thus made several attempts to focus attention on the needs of technical education and to promote its spread in the country. But the efforts and discussion failed to achieve any tangible and far-reaching results for one simple reason. The industrial policy of the Government was not only halting but also under the influence of the doctrine of *laissez-faire*. This negative policy was mainly responsible for the limited progress of technical education and for the unplanned and unco-ordinated growth of institutions in different parts of the country. The dangers of this policy were not perhaps evident in the early years, but when one reviews the position today, one cannot but be grieved by the uneconomic waste of efforts and loss of valuable opportunities which resulted from the policy. We are not, however, mainly concerned with the all-India position, or with problems that await solution on an all-India scale. We need not, therefore, go into further details and may now turn to the growth of technical education in Bengal proper. In the year 1856, provision was made for the first time in Bengal for training in advanced engineering. The establishment of a College at Fort William at the instance of the Public Works Department with the object of training Indian engineers and subordinates for their service marks the beginning of engineering in education in Bengal.

28. **Progress of Technical Education in Bengal.**—The beginning of technical training in Bengal may, therefore, be traced to the year 1856. The Engineering College at Fort William was later transferred to the Presidency College in 1864. In 1878, the Government of Bengal appointed a Committee to consider and report on measures necessary for the establishment of a technical school connected with the workshops and manufactories of the Public Works Department of Bengal. The Committee was asked also to consider whether it would be desirable to remove the civil engineering branch of the Presidency College to the neighbourhood of the technical school to enable the two to work together as one institution for imparting a complete technical education and training for engineers. The Committee's recommendations were endorsed by the Government of Bengal and in 1880 the Engineering College, Sibpur, was established. In 1887, the Public Works Department decided to discontinue the workshops at Sibpur for their own constructional work. A Committee was appointed by the Government of Bengal for suggesting alteration in the course of studies and the method of instruction at the Sibpur College. From documents printed in the "Papers relating to Technical Education in India, 1886-1904", it appears that there were quite divergent views as to the success and usefulness of the College. The Committee did not approve of the abolition of the workshops. This proposal was rejected also by the Government of India who stated that "The Governor-General in Council attaches great importance to the maintenance and expansion of the College as a School of practical as well as

of theoretical instruction, likely in time to develop into an institution for technical instruction in its highest sense." In their Resolution, dated the 9th October, 1891, the Government of Bengal expressed the view that Sibpur College should become the "centre of industrial education in Bengal" and was expected to prove of the greatest services to local technical schools by supplying them with trained teachers and by receiving their most promising pupils for advanced instructions. In accordance with this Resolution, the Survey School at Dacca established in 1876 was affiliated to Sibpur College, presumably as a part of the general scheme to make the College the technical centre of Bengal. As subsequent events show, the scheme, however, did not materialise.

29. **Enquiry into Arts and Industries of Bengal, 1890.**—The necessity for a suitable system of technical education in Bengal was also stressed in the report of Mr. E. W. Collin, I.C.S. In accordance with the Government of India Resolution of 1888 which suggested that every province should have an industrial survey, he drew up a report in 1890 on the Arts and Industries of Bengal. The second part of his Report dealt with the subject of Technical Education. His view on the system of technical education was that there could be no uniformity, for each country should adopt a system specially suited to its needs and requirements. In his report, on technical education the principal proposals were as follows:—

- (1) The establishment of a school for mining students in connection with the coal mining industry
- (2) The training of mechanical engineers by the introduction of apprentices into the workshops connected with State Railways.
- (3) The provision of special training for apprentices and intelligent workmen in the Railway and Canal Workshops in Calcutta and the suburbs.
- (4) The institution of improved industrial schools and the encouragement of industrial classes.
- (5) The appointment of an Inspector to supervise industrial education.
- (6) Private firms and municipalities and district boards should be encouraged to open technical schools.

30. **Suggestions on the Industrial Development.**—On the question of industrial development the suggestions of Mr. Collin were as follows:—

- (1) The stimulation of native industries by the preparation or purchase of materials of public works in India, and not in England
- (2) The establishment of a School for drawing and designing for industrial purpose and the circulation of designs among native workers.
- (3) The circulation of practical instructions among leading braziers regarding moulding and working in dies.
- (4) The introduction of schools for mat and basket work in localities where the business is carried.
- (5) The improvement of ornamental pottery
- (6) The establishment of weaving schools at Berhampore in connection with silk and cotton weaving.

31. **Outcome of the Enquiry.**—Although the Report was never published, it was reviewed by the Government of Bengal in 1891. They decided to carry into effect some of the suggestions of Mr. Collin. For instance, they decided to push on the training of mining assistants, to establish a boarding house for the training of apprentices in mechanical engineering at Kanchrapara and to establish a cotton weaving school at Berhampore. In Sibpur College, provision was made in 1896 for a course of electrical engineering and in 1906 for mining instruction. Teaching in drawing was introduced in primary and secondary as well as training schools. In 1904, a Committee appointed by the Government of Bengal recommended that a Central Weaving Institute should be established at Serampore instead of at

Berhampore. The reorganization of the School of Art was also carried out. These in brief would constitute the outcome of the proposals contained in Mr. Collin's Report on technical education.

**32. A Review of Educational Progress (1893-97).**—In the Quinquennial Review of the progress of Education in India (1893-97), by Mr. J. S. Cotton, published in 1898, some tracts of the progress in technical education are to be found. As regards conditions in Bengal, the Review referred to the improvements at Sibpur in providing instruction in photography and in electrical engineering, the reorganisation of the Calcutta School of Art, the introduction of a systematic course for draftsmen, drawing masters, industrial art, etc., in industrial schools and survey schools and the existence of 23 industrial schools in the province. The next Quinquennial Review of the Progress of Education in India up to 1902 refers to further improvements, but with regard to the working of industrial schools, the observation in the Review was not very flattering. It observes—

“It may be admitted at the outset that the endeavours made up to the end of the quinquennium under review to provide through State Agency or under State control a system of technical education better than routine training of the bazar have met with little success. The subject which has taxed the ingenuity of the educationist of all countries, presents a specially different problem in India. For the organized industries, the conditions are not dissimilar from those which prevail in Europe; but for the industries which are prosecuted on a small scale by the majority of the industrial population, they are much more complex and difficult.” The author of the Review further pointed out that there was one class of school which aimed at raising the intelligence and increasing the manual skill of the artisan, and another class which simply trained up boys to earn a livelihood

**33 Simla Educational Conference of 1901 and after.**—As already pointed out, a cycle of enquiries, discussions, investigations and resolutions by the Government of India regarding technical education in India started by 1901. The Report of Sir Edward Buck published in 1901 suggested that technical education as applied to industries should be under a separate executive department in each province; and what was required was a special trade school for each industry in the areas where it was carried on and further only those should be taught who are likely to follow it. The Simla Conference pointed out that technical education should have a definite object and should be specialised. In a communication to the Government of Bengal dated the 30th November, 1901, the Government of India stressed the fact that the development of industrial schools was a matter of supreme importance and instruction in such schools should be dissociated from the ordinary type of literary instruction. The Committee on Industrial Schools in their Report published in 1903 held that for training artisans a system of apprenticeship in workshops should be preferred to a system of class instruction in Schools. After reviewing the Report of the Committee, the Government of India laid down two broad principles, viz.—

- (a) That at great industrial centres it should be possible to have whole-time schools for instruction in both workshop practice and theory; and the active co-operation of employers of labour should be enlisted
- (b) That for local handicrafts half-time industrial schools should be started for teaching on the one hand through the agency of an approved artisan, accuracy of workmanship so as to develop a boy's inherited skill, and on the other hand, for teaching in a primary school such general education as will enlarge his prospects as a craftsman while preventing him from falling into a clerical groove

**34 Proposals by the Director of Public Instruction.**—The suggestions contained in the Government of India letter, dated the 20th November, 1901, were reviewed by the then Director of Public Instruction (Mr. Pedler) who

formulated the following proposals—(a) class instruction should be continued; (b) geometrical drawing and designing should be taught; (c) industrial education should be on caste lines; (d) Government local bodies and the public should help in providing scholarships; (e) a beginning should be made in Bengal with one of the industries, preferably weaving and preferably weaving in silk at Rampur Boalia in Rajshahi district; (f) the apprentice system should be encouraged; and (g) if a beginning be made at Rampur Boalia, other weaving schools might be established at Berhampore and Serampore. In 1904 the Government of Bengal reviewed the position and appointed a representative committee consisting of delegates from the Chambers of Commerce to consider the proposals of Mr. Pedler (Sir Alexander Pedler). The Committee were in favour of Serampore instead of Rampur Boalia and their more important recommendations which were accepted by Bengal Government and were submitted to the Government of India were:—

- (1) That a school for the teaching of improved methods of hand-weaving in silk, cotton and wool should be opened at Serampore under an expert inspector to be recruited from some big manufacturing centre in England and it should also teach drawing and designing;
- (2) That a higher class should be opened there for the introduction of men of the Sibpur apprentice type, who would in turn become teachers, assistants to manufacturers and manufacturers; and
- (3) That a lower class should be opened there for the instruction of weavers and their sons, that similar instruction be given at other selected centres and that all pupils at the school be supported by scholarships

The Government of India approved of these proposals and the Secretary of State also sanctioned them.

35. **Another industrial survey of Bengal.**—In 1908 an industrial survey in Bengal was carried out by Mr J. G. Cumming, I.C.S. His report was divided into two parts. The first part dealt with industrial and technical instruction in Bengal and the second part with the existing position of industries in Bengal. He reviewed the position since the survey by Mr Collin and also the results achieved thereafter. Two important proposals of Mr Cumming were the appointment of an expert Director of Industrial Enquiries and the appointment of an officer with the title of Superintendent of Industries. The post of the Inspector of Technical and Industrial Institutions in Bengal was sanctioned in 1909. During the same year, a Conference on Industrial Education held at Dacca (then in the province of Eastern Bengal and Assam) proposed the creation of a Department of Industries to be entrusted with the control of technical and industrial education. The Conference also recommended the establishment of a Central Industrial Institute at Dacca, for lower courses of a practical character and to incorporate with it the existing School of Engineering at Dacca.

36. **Suggestion for a Central Technological Institute in Calcutta.**—The suggestion for the removal of the Civil Engineering College from Sibpur to another site was first mooted at about 1903. This gave rise to a series of schemes for technological and engineering education in Bengal. A proposal to remove the Engineering College from Calcutta to another centre like Ranchi was under consideration for a long time. It was recognised that even in that case, a good deal of the work would have to be continued in the neighbourhood of Calcutta. Mr Cumming in his Report of 1908 had advocated the development of the Sibpur College “as an engineering college proper to teach civil, mechanical, electrical, mining and sanitary engineering in its existing form with certain modifications.” In 1912 at the instance of the Government of India, the Government of Bengal appointed a Committee presided over by Mr. F. A. Slacke to enquire into and

advise the Government, among other things, on the question of creating a technical institute in Calcutta to give instruction in some of the subjects in the present courses of the Sibpur College. The Committee strongly recommended to Government the creation of a technical institute in Calcutta and independent thereof, the creation of a residential well-equipped civil engineering college; but if these two could not be provided separately, provision of a non-residential nature might be made for the teaching of higher civil engineering in the technical institute. At the same time some members of the Committee considered a residential college essential for the proper training of civil engineers. In the opinion of the Committee the authorities of the Technical Institute should not be prevented from opening classes in higher civil engineering, if it was considered desirable, even if the residential college for civil engineering were established by Government. The subjects at the Technical Institute were to include Mechanical and Electrical Engineering in both the higher and lower grades; civil engineering upto and including the overseer grade, textile subjects and commercial subjects. They recommended also a small section for technical chemistry for teaching subjects required for the engineering branches as well as the dyeing required in the curriculum of the textile department. The Committee also recommended the discontinuance of the mining department of the Sibpur College. We have already referred to the report of the enquiry undertaken by Lt. Col E. H. Dev. Atkinson and Mr. T H Dawson at the instance of the Government of India in 1912. This contained several conclusions which had a direct bearing on the problems of the future of the civil engineering college and the proposed Technical Institute. In 1913 again, a Committee of three, Messrs. R. Nathan, G W Kuchler, and W. A. Everett were appointed to work out a detail scheme for the technical institute in Calcutta. The Committee recommended that it should at the outset comprise the following departments.—

Departments.	Number of students.	
	Day classes	Evening classes
Engineering—Mechanical, electrical and civil ..	300	300
Textile fabrics, jute and cotton	70	..
Chemistry, for engineering, textile and special students	15	..
Printing	110	..
Commerce	140	60
For women—Dress-making and millinery and commerce	40	.
	<hr/> 675	<hr/> 360

37. **Recent developments in Bengal.**—The above resumé of the progress of technical education in Bengal from the year 1856 gives in outlines the history of technical education in this province. While efforts were many and the Government did not entirely lack in enthusiasm to shape a suitable policy of technical education, little effective was done for lack of a sustained and comprehensive policy. We may now review the more recent developments in order to better assess the needs and requirements of the present generation.

38. **The Sadler Commission.**—Among recent developments, mention should be made of the Report of the Sadler Commission which functioned during 1920-21 and submitted a valuable Report on the reorganization of different Departments of Calcutta University. Although the Commission concerned itself mainly with higher technological studies under the University, their findings and recommendations have a bearing on the entire system of technical education which evolved thereafter. They reviewed the then existing facilities of training and research in technology, engineering, mining, architecture, agriculture and commerce and recommended definite lines of reorganization to be carried out in the Technological Departments of the University. The Commission while

suggesting what departments of applied science and technology should be established under the Calcutta University observed as follows:—

“Calcutta is evidently a convenient and suitable centre for the advanced training of students to meet the requirements of—

- (i) The leather industries.
- (ii) The chemical industries (including those concerned with the manufacture of dyes).
- (iii) The oil and fat industries
- (iv) Some branches of textile industries.”

Of other important recommendations of the Commission, one was to constitute Advisory Committee in connection with each Technological Department so as to secure effective co-operation between the Technological Departments and the industries. This recommendation has been given effect to, by the University. -

**39. Appointment of the Mukherjee Committee.**—Mention should also be made of the Report of the Committee appointed by the Bengal Government in their Resolution No. 348Ed, dated the 27th February, 1919, to co-ordinate the scheme of Apprentice Training in the Eastern Bengal Railway Workshops at Kanchrapara with the Mechanical Engineering Classes of the Sibpur College. The Committee was presided over by Sir Rajendra Nath Mookerjee and the specific terms of reference to the Committee were as follows:—

“The Committee will consider and advise Government as to the arrangements that should be made to afford selected mechanical apprentices in the Eastern Bengal Railway Workshops an opportunity of taking advantage of the courses at Sibpur College in order to obtain a higher specialized training in subjects bearing on their work, the arrangements being based on the general lines of the recommendations contained in the report of the Sub-Committee. The scheme recommended should, if possible, be such that it may be directly applicable also to other workshops, the authorities of which may desire to participate in it, and it should have regard to the requirements of Indian as well as European apprentices”

**40 Findings of the Committee.**—In formulating their recommendations, the Committee adopted the following two principles:—

- (a) The mechanical engineering training could only be given by effectively combining sound practical training in commercial conditions with simultaneous theoretical training and that this could not be done with the best results by utilizing the resources of an engineering college (Sibpur) throughout the course;
- (b) That the scheme recommended for Kanchrapara should be such that it could be applied to the training available at other large workshops in Bengal.

In the opinion of the Committee the recognition of the first principle involved the establishment of a suitable technical school at Kanchrapara and the abandonment of the lower classes (first and second years) in the mechanical engineering department of the Sibpur College. Sibpur was to be utilised for the final training of the mechanical engineers, after they had completed at Kanchrapara or elsewhere the full course of workshop apprenticeship. The second principle adopted by the Committee rendered necessary the encouragement of other centres of apprenticeship training in addition to Kanchrapara, and their co-ordination, with a view to making the best use of the resources at Sibpur for the final period of training. This second requirement involved

the establishment of a common standard for entrants for the courses and for the final examination. Accordingly the appointment of a Board of Control was recommended with the following functions:—

- (a) The conduct of apprentices' admission examination.
- (b) A general control over technical education in schools and technical institutes.
- (c) The co-ordination of this technical education with practical training.
- (d) The regulation of courses of study.
- (e) The conduct of final examination to be mechanical engineering classes at Sibpur.
- (f) The conduct of final examinations for apprentices not proceeding to Sibpur.
- (g) The grant of diplomas to these apprentices and to those who finish at Sibpur.

In accordance with the recommendations of the Committee, the Board of Control for Apprenticeship Training was created in 1921 and began to function.

**41 Recommendations of the Unemployment Committee (1925).—**On the question of technical education, the Unemployment Committee made the following recommendations:—

“We strongly recommend the immediate adoption of a comprehensive scheme for technical education (the term being used in its widest sense including vocational and industrial instruction).

(1) As a means to this end we strongly recommend that a Board of Technical Education should be established for the control of what may be described as the training, both theoretical and practical, for industry and commerce. The functions of this Board should include—

- (a) The provision of educational facilities for the training of workmen, supervisors, foremen and managers for all the existing industries, including mining and jute.
- (b) The establishment and control of standards of theoretical and practical training.
- (c) The conduct of examinations.
- (d) The control of the standards of all institutions providing the theoretical training through grants-in-aid.
- (e) The estimation and publication of the prospects of employment in various occupations and the courses of training to be followed to enter such occupations.
- (f) Assistance to trained men in finding employment through the establishment of an Employment Bureau for those who have been trained according to the standard set down.

(2) The total Government grant for this form of education should be placed under the control of the Board subject to Government audit

(3) The composition of the Board should be representative of industries and commerce as well as of the general public with a leaven of educationists.”

**42. Recommendations not accepted.—**None of the recommendations were accepted and carried into effect by Government. The objections which were raised to the formation of a comprehensive Board as suggested by the Unemployment Committee were as follows:—

- (1) To be effective, it would require to be a small Board
- (2) It would presumably be constituted with an expert in each of the following technical subjects:—(a) Engineering, (b) Commerce, (c) Mining, (d) Art, (e) Agriculture, (f) Chemical industries, etc.,

and the allocation of funds would result in a kind of tug-of-war between the members in the interests of the special form of education which they represented.

- (3) The special Boards of experts which exist for each type of education would still be necessary.
- (4) Such a Board would not be in a position to criticise the technical proposals, if their present Boards were formed with experts in each particular line of education.

**43. Board of Control found wanting.**—The Unemployment Committee in recommending the establishment of a comprehensive Board of Technical Education considered the functions and activities of the Board of Control to be too limited. In the Report (1928) of the Sub-Committee of the Board of Control for Apprenticeship Training, the scope and functions of the Board came in for further detailed examination. While considering the further future constitution and status of the Board, the Sub-Committee found the results achieved by the Board to be very meagre and unsatisfactory. Analysing the results of the examinations held during the period from June 1922 to June 1927, the Sub-Committee observe as follows:—

“On the average of, say, the last five examinations, the percentage of those appearing who passed the examination is just under 22 per cent., in respect of those below 19 and nil in respect of those over 19. But on the average of the four examinations from January 1926 to June 1927, the percentage of those candidates who having passed the examination and have subsequently joined workshops, is only 4½ per cent. of those appearing at the examinations. It is at least doubtful whether these results can be considered satisfactory. Further, while the Board in 1921 decided that the ratio of the number of students admitted direct to the Sibpore College to those admitted from technical schools should be as 1 : 3—this ratio to be reached by 1923—actually only one or two students have gone from Kanchrapara to Sibpur and none at all from the Calcutta Technical School.”

**44. Reasons for the failure of the Board.**—The reasons for the failure of the Board may be detailed as follows:—

- (a) The severity of the entrance examination excluded certain potential candidates who might have been usefully employed on mechanical work.
- (b) There was a lack of liaison between the employer and the would-be employee.
- (c) The Board was not in personal intimate touch with the young men whom it desired to assist
- (d) Its scope was somewhat restricted in that it did not differentiate between the three types of apprentices recognized in England and other countries, viz., the student apprentice, the trade apprentice and the boy artisan.
- (e) It did not attempt by widening the scope of its activities to bring new industries within its sphere of action.

In view of these drawbacks, the Committee suggested a reorganization of the Board and its being renamed Board of Apprenticeship Training. Accordingly the Board was reorganised and renamed; but it has not so far achieved success as was expected

**45 Report on Vocational Education in India by Messrs. Abbott and Wood.**—In August, 1936, the Government of India addressed a communication to the India Office requesting the Secretary of State to obtain the help of the Board of Education in selecting suitable persons from England to visit India in order to advise on certain problems of vocational education. Messrs. A. Abbott, C B E., and S. H. Wood, M.C., were accordingly sent out



to India and they started their enquiry in November, 1936. Their itinerary covered only Delhi, United Provinces and the Punjab. Their Report was necessarily based on the study of the educational system and institutions obtaining in these provinces only. The principles of vocational education which the authors of the Report enunciated and their applicability to Indian conditions and requirements have however significance for other provinces as well. Their Report may, therefore, be consulted in outlining any programme of technical education for any part of India, not necessarily for copying their recommendations but for evolving the best system suitable for Indian requirements in the light of the views of these two British experts.

**46. Terms of reference of the Enquiry.**—The terms of reference for their enquiry were as follows:—

“To advise—

(1) Whether any vocational or practical training should be imparted in primary, secondary and higher secondary schools and if so, what should be its nature and extent?

(2) In the light of answer to (1), to advise whether the technical or vocational institutions already in existence can be improved and if so, in what nature, and, if new institutions for vocational or technical training be required, to suggest—

(i) the type of institution or institutions required for the purpose;

(ii) the stage at which diversion of the students from the ordinary secondary schools (lower or higher) to such institutions should be effected; and

(iii) the means to be adopted for such diversion, i.e., vocational guidance.

(3) The differentiation or special arrangements needed to meet the special requirements of rural areas, specially in view of the desirability of remedying the trend of the present educational system to draw many boys and girls from rural areas to towns where they receive a purely literary form of education and, by so doing, not only congest still further the high schools, but also become very largely lost to the service of the countryside.”

**47. Nature of the recommendations.**—The terms of reference as quoted above cover nearly all the important issues that are now before the country. The Committee did not visit all the provinces and acquaint themselves with the local problems and requirements of different regions. Some of their findings are, therefore, of limited applicability so far as Bengal is concerned. The general plan of the Report was that it was prepared in two parts. Part I relating to General Education and Administration was written by Mr S. Wood while Part II concerned Vocational Education and was prepared by Mr A. Abbott. Mr. Abbott's Report was fairly comprehensive and the keynote of his suggestions was that the expansion of vocational education should be cautious and closely connected with the needs of industry. Another important suggestion in his Report was that every province should make a survey of the educational needs of its industries and commerce and thus determine the necessary types of vocational education, the stage to which each type should be carried and especially the number of recruits that could be absorbed annually. Until such a survey had been made, it was impossible to do more than prepare an educational frame-work into which vocational schools and courses of instruction could be fitted.

**48. Memorandum on Technical Education by Mr. J. Sargent.**—Early in 1939 the Government of Bengal invited Mr. John Sargent, M.A., Educational Commissioner with the Government of India, to visit Bengal and advise on certain matters concerning the development of technical education in this province. In March, Mr Sargent came out to Bengal and visited certain

centres. In his memorandum on the existing system of technical education in Bengal, he conceived the functions of technical education from a wider perspective and recommended the establishment of (i) one Central Technical Institution (Polytechnic) in Calcutta, (ii) Polytechnics in suitable areas at which the more advanced work in all branches should be concentrated with ancillary schools conveniently distributed, which will relieve them of the more elementary work and feed it in turn with suitably prepared students, (iii) Mono-technical Institutions only in case of industries which are highly localized or where their needs are so complicated or peculiar that it is difficult to satisfy them in the same institution as those of other industries or where the material to be dealt with, as in leather industries, renders it to be an uncomfortable neighbour, and (iv) Technical High Schools which will be of the nature of an educational experiment and will aim at imparting to "pupils of the normal high school type an alternative form of higher education of a less academic character which will allow a greater freedom of choice both to pupils and teachers and will comprise in the later stages grouped courses incorporating the principles of technology and of commerce". In regard to the Central Institution and a Polytechnic he suggested the following organization:—

(i) The Central Technical Institution at Calcutta should contain the following principal departments:—

- (a) Science Department;
- (b) Mechanical Engineering Department;
- (c) Electrical Engineering Department;
- (d) Civil Engineering Department;
- (e) Commercial Department; and
- (f) Art Department.

(ii) A polytechnic with or without ancillary institutions should provide for—

- (a) A full time day school for boys of the normal high school age and type whose training will be based on the assumption that they may rise ultimately to position of responsibility
- (b) Part-time classes in the day and in the evening both for younger employee (including apprentices) and for older workers.
- (c) Classes full-time or part-time for more advanced students and for research workers.
- (d) Adult education of a non-vocational kind.

These are the important recommendations of Mr. Sargent some of which we shall have occasion to discuss while considering schemes of technical education for Bengal in subsequent chapters.

### CHAPTER III.

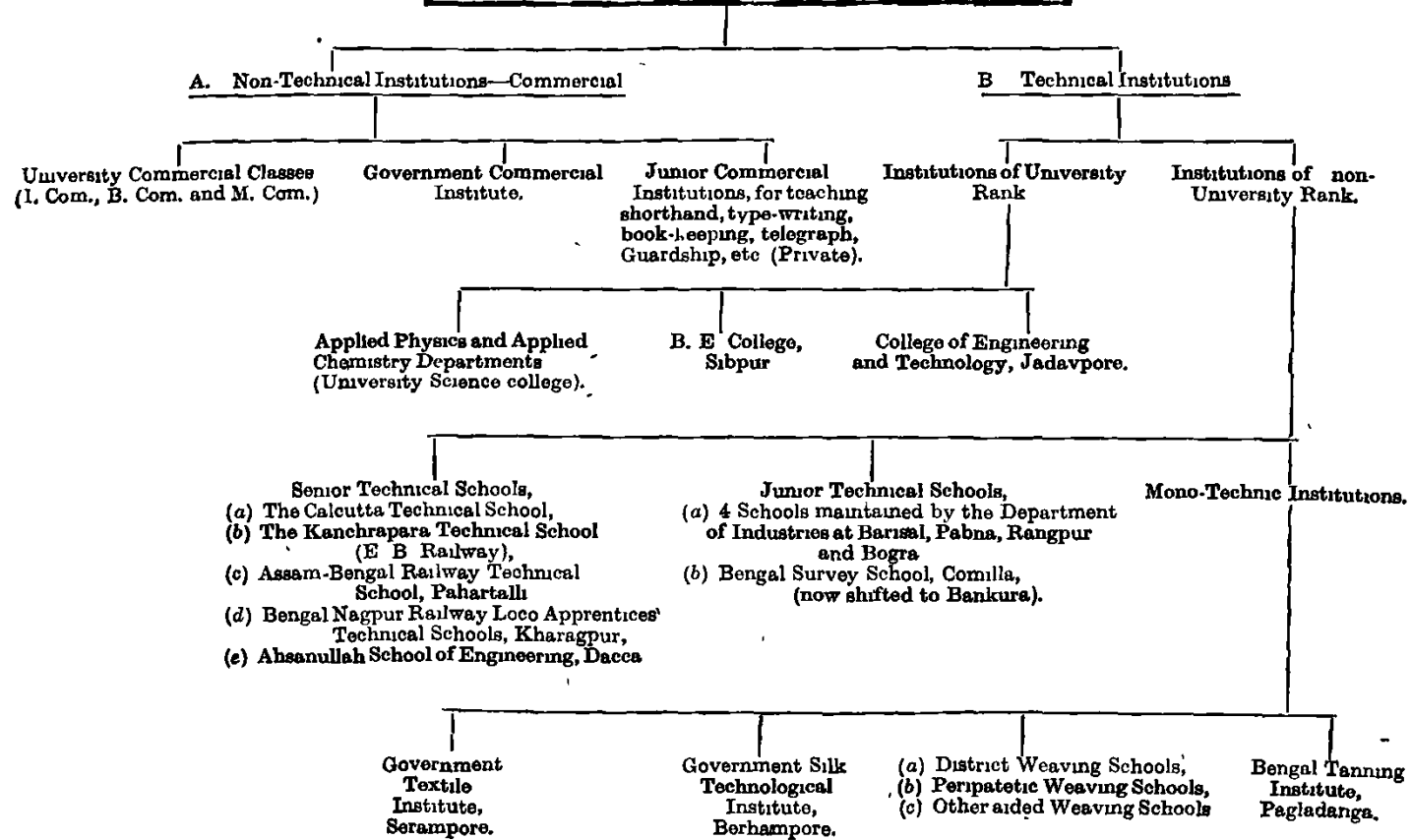
#### The Existing System of Technical Education in Bengal.

49. **Need for a review of the existing arrangements.**—In the previous chapter we have briefly outlined the landmarks in the evolution of the system of technical education in this country. Various efforts to assess the problems and requirements of the people which were undertaken have also been noticed. We shall in the present chapter describe the existing system of technical education. Our suggestions for improvement must be based on a correct assessment of what we have and what we need today.

50. **A resumé of the existing system.**—The following chart gives in a tabulated form a brief resumé of the existing system of technical and industrial education in Bengal:—

## DIAGRAM I.

### THE SYSTEM OF TECHNICAL EDUCATION IN BENGAL



51. **Two broad categories of Technical institutions in Bengal.**—The present organization of vocational education in Bengal may thus be broadly classified into “Technical” institutions and “Non-technical” institutions. The latter comprise the various commercial institutions of both university and non-university rank. Medical institutions which are excluded from the conventional connotation of the term “Vocational” may also be considered under this heading.

#### **A. Non-Technical Institutions—Commercial.**

52. The commercial institutions fall under two distinct categories according as these do or do not belong to the University rank. Those belonging to the former category comprise the commercial classes of both under-graduate and post-graduate standard run by the Universities of Calcutta and Dacca, two first grade colleges affiliated with the Calcutta University and also the Government Commercial Institute in Calcutta which prepares students not only for examination in subjects like Economics, Business Methods, Commercial Geography, Book-keeping, Shorthand and Typewriting, conducted by the Institute itself but also for some other examinations of a higher standard including the First Registered Accountants Examination held under Auditor’s Certificate Rules of 1932. This Institute is given University rank as students obtaining certificates at its final examination are entitled to secure admission to B Com. and B.A. classes of the Calcutta University.

53. **Principal features of Government Commercial Institute.**—The Government Commercial Institute has a fairly comprehensive organization and imparts commercial training whose object is entirely vocational. It provides both lower and higher standards of training. This Institute, established in 1905, “confers training of a practical character capable of direct application to the requirements of the business world. It is neither an ordinary college in which the academic elements exceed the vocational, nor a simple secondary class of commerce, but a higher academy of commerce, in which vocational element predominates in liberal measure. It is controlled by a Board of Management composed of the representatives mainly of the mercantile community. It follows a carefully planned curriculum and grants its own Diplomas and certificates signed by the Principal and countersigned by the Secretary of the Bengal Chamber of Commerce and the Director of Public Instruction, Bengal”. It conducts both Day and Evening classes, the latter being intended mainly for those who are already in employment and require advanced and technical instruction in subjects of particular interest with a view to improving their efficiency and earning capacity. The complete course in the Institute extends over a period of two years at the end of which students are allowed to sit for the Final Examination controlled by the Government Commercial Institute Board. As a rule, only Matriculates are eligible for admission to the Institute.

54. **Junior Commercial Institutions.**—Besides the above institutions of University rank, there is a number of private institutions mostly in Calcutta which maintain facilities for teaching such subjects as shorthand, typewriting and book-keeping. These institutions are independent of Government or University supervision and do not follow a uniform curriculum of studies. The training imparted by these institutions is helpful to a certain section of clerks in securing jobs in Government and mercantile offices.

#### **B. Technical Institutions.**

55. Technical Institutions also may be grouped under University and non-University ranks.

**B. E. College at Sibpur.**—Among technical institutions of the University rank special mention must be made of the Government Engineering College at Sibpur. As already indicated in Chapter I, it has had a chequered career since its establishment in 1880. The Industrial Commission examined the

facilities for training provided by the College and finding them to be inadequate, sounded a note of warning. As opportunities for service under Government, District Boards or Municipalities were bound to be gradually restricted, it was incumbent on the College authorities to attach greater importance to instruction in Mechanical and Electrical Engineering. The scope of training available in the Bengal Engineering College has since undergone considerable expansion. The College offers now the following courses:—

- I. Civil Engineering;
- II. Electrical Engineering;
- III. Mechanical Engineering; and
- IV Metallurgy and Chemistry.

Degree examination in these courses has been introduced. The College also provides for Diploma examination and Associateship examination in mechanical and electrical engineering, which are conducted by the Board of Apprenticeship Training, to which a reference is made hereafter. The minimum age for admission is 19 years and minimum entrance qualification is I.Sc., or an equivalent examination of a recognized University or an Examination Board under the administrative control of the Department of Education. The chief executive of the College is the Principal, but there is a Governing Body appointed by the Bengal Government which acts as an Advisory Body with regard to admissions of students, award of stipends, preparation of budget estimates, etc.

The number of students admitted to each course and the number of students passed out are stated below:—

Courses.	Number of students admitted.		Number of students passed out	
	1942-43	1943-44	1942-43	1943-44.
	Civil Engineering .. .. .	55	82	28
Mechanical Engineering . . . . .	25	28	7	11
Electrical Engineering . . . . .	16	17	8	5
Metallurgy . . . . .	18	14	9	12
Diploma . . . . .	6	5	4	6*

\*Includes B N. R. Apprentices.

56. **Other Institutions.**—Apart from the Sibpur College, which stands by itself among institutions of University rank, technical education is now being imparted through a number of institutions that may be conveniently brought under several distinct standards. These institutions may be classified into several groups on the basis of (a) the initial qualifications of pupils for admission and (b) their expressed aims.

57. **Senior Technical Schools.**—Among the Government-aided technical institutions, the following schools may be specially mentioned:—

- (1) Asanullah School of Engineering;
- (2) The Calcutta Technical School;
- (3) Kanchrapara Technical School (B. and A. Railway);
- (4) Assam Bengal Railway Technical School, Pahartoli;
- (5) Bengal-Nagpur Railway Loco. Apprentice Technical School, Kharagpur.

The first institution is under the administrative control of the Department of Education, while the second is a private institution receiving aid from Government. The last three schools are under the control of the respective Railways, although they receive also Government aid.

58. **Ahsanullah School of Engineering.**—This school at Dacca provides for training in overseeing, sub-overseeing and artisan courses. It is in fact the only institution where training is given in overseeing courses, while

sub-overseering classes are also held in the Technical Schools at Pabna, Rajshahi and Burdwan. It may be pointed out in this connection that those who have passed the sub-overseership examination can take the overseer course covering a period of two years. The overseer and sub-overseer examinations are controlled by a Board known as Overseer Examination Board. The Chief Engineer, Communications and Works Department, Road and Buildings Branch, is the President and the Inspector of Technical and Industrial Institutions, Bengal (under the Department of Industries) is the Secretary of the Board.

**59. Board of Control for Apprenticeship Training.**—Barring Ahsanullah School of Engineering which is a type by itself and is not in any way connected with the Board of Control for Apprenticeship Training, all other schools bear a relationship with the Board. So for a correct appraisal of the organization and function of the different categories of technical schools below the University rank, it is necessary to make a reference to the Board set up in June 1921. The Board owes its origin to the recommendation of the Mookerjee Committee appointed by the Government of Bengal in 1919 to advise Government regarding arrangements for higher specialised training at the B. E. College to selected mechanical apprentices in the E. B. Railway Workshop. The Governing Body of the B. E. College had for some time past been considering the question of improving the training of Mechanical Engineers in Bengal. In 1918 they submitted a Report to Government and recommended that an attempt should be made to introduce a scheme in co-operation with the Railway companies by which their best mechanical apprentices should be sent to the B. E. College for higher theoretical training. It was this proposal of the Governing Body of B. E. College that led to the appointment of the Committee of 1919. The Committee recommended that training in Mechanical Engineering could be given only by combining practical training under commercial conditions with simultaneous theoretical training. They accordingly recommended that courses of instruction in workshops ought to secure the efficiency of the workshop instructors and at the same time allow suitable modifications to suit individual shops. They also recommended the establishment of a technical school at Kanchrapara where theoretical training could be co-ordinated with practical work. Another recommendation was that the lower classes in the Mechanical Engineering Department at the B. E. College should be gradually replaced by the Technical School at Kanchrapara and similar schools elsewhere. The Committee also stressed the need of a common standard of entrance to Apprenticeship for the courses to be taught at the schools and for the final examination. To attain this purpose they recommended the creation of a Central Board called the Board of Control for Apprenticeship Training. The general policy of the Board has, right from the outset, been to secure the co-operation of workshop authorities and thus co-ordinate workshop training of apprentices with theoretical instruction according to the capacity of each apprentice.

**60. Examinations conducted by the Board.**—It appears from the report of the Board that it has been conducting the following examinations:—

- (1) Apprenticeship Admission Examination to which reference has been made above.
- (2) Annual Examination for technical schools, viz., the Calcutta Technical School, Kanchrapara Technical School, the Assam Bengal Railway Technical School, and the Bengal Nagpur Railway Technical School.
- (3) Diploma Examination for students of the B. E. College.
- (4) Associateship Examination for students of the B. E. College.

It will be seen that the Board of Apprenticeship Training thus constitutes the pivot of higher grade technical education now imparted through most of the Senior Technical Schools and the Diploma and Associateship Courses of the Bengal Engineering College.

61. **Means of achieving the end.**—The means adopted towards these ends by the Board are as follows—

- (a) All apprentices under the control of the Board have to pass an admission examination to ensure a minimum standard of preliminary general education.
- (b) Model schemes of workshop training are laid down. All apprentices under the Board of Control are required to undergo training in a workshop approved for the purpose or in a suitable smithy approved by the Board.
- (c) During their apprenticeship all apprentices under the Board have to attend the classes in a Technical School approved by the Board. Periodical examinations are held and the results of these are reported to the Board.
- (d) Arrangements have been made with the Bengal Engineering College to give higher instruction in Mechanical and Electrical Engineering to apprentices who seem capable of rising to positions higher than those open to trainees of technical schools.

The rules of the Board provide that candidates for apprenticeship must be between the ages of 16 and 19 years. Overage candidates who are already apprentices in recognized workshops may appear; but such overage candidates are not eligible for a certificate unless they were under 19 years at the beginning of their apprenticeship.

62. **The Calcutta Technical School.**—The School offers the following courses of instruction.—

- (1) Electrical and Mechanical Engineering;
- (2) Plumbing and Sanitary Engineering;
- (3) Electrical Supervisors' Course.

The electrical and mechanical engineering course is of five years' (10 terms) duration.

The plumbing and sanitary engineering course is of at least three years' duration. The Final Certificate issued for this course has been made a necessary qualification for the registration of Plumbers by the Corporation of Calcutta.

The Electric Supervisors' Course is of one year and is designed to meet the requirements of workers in the electrical industry preparing for a certificate of competency as issued by the Bengal Electrical Licensing Board. The students of these courses are usually selected on the results of an admission test examination held by the Board. The number of students admitted under each course and the number of students passed out are stated as follows.—

Courses	(1939-40) Number of	
	Number of students admitted	students passed.
Electrical and Engineering Course	141	120
Plumbing and Sanitary Engineering	13	10
Electric Supervisors' Course	19	9

63. **Ordnance Technical School, Ishapore.**—Along with the five Senior Technical Schools already referred to, mention may also be made of the Ordnance Technical School at Ishapore. Although conducted by the Ordnance Department and primarily for the recruitment of the staff in the various branches of the Department itself this school has been receiving regular grants from the Government of Bengal through the Industries Department. A passing reference may, therefore, be made to the nature of training given by this school and the type of pupils likely to benefit by it.

The period and course of training in the Ordnance School are as follows:—

	Years.*
Metal and Steel Factory ... ..	4
Gun Carriage Factory ... ..	5
Cordite Factory . . . . .	4
Rifle Factory .. . . .	5
Gun and Shell Factory ... ..	5
Harness and Saddlery Factory ...	4
Clothing Factory ... ..	6

On the completion of the training period, there is ordinarily a further 2 years' Journeyman Course. This is not necessarily given in Ordnance Factories, and ex-apprentices are, during this period, expected to earn their own livelihood. There is no guarantee for employing apprentices on the completion of their course though, as a rule, they are provided with employment in the Ordnance Factories. The selection of candidates for appointment is, however, made on the recommendation of the Public Service Commission.

**64. Qualification and selection of candidates.**—The candidate is required to make an application before such date and in such form as the Governor-General in Council may direct. The rules laid down in this connection provide that candidates for appointment as apprentices to the Metal and Steel Factory must have attained the age of 18 years and must not have attained the age of 21 years on the 1st day of January of the year in which the selection is made. Candidates for appointment to the other factories must be under 19 years of age on the date specified above. It is further provided that candidates for appointment to the Metal and Steel Factory must hold the diploma in Metallurgy of the Benares Hindu University, the Diploma of the Indian School of Mines, Dhanbad, or the Degree in Science of a University approved by the Governor-General in Council. Candidates for appointment to the other factories must have passed the Intermediate Examination in Science or Engineering of a University or Board approved by the Governor-General in Council or the Cambridge Higher School Certificate Examination or the Higher Diploma Examination of Mayo College, Ajmer. It is necessary for all candidates to have an elementary knowledge of Dynamics, Statistics and Mathematics, Elementary Trigonometry and Physics.

### C. Other Technical Institutes of Senior Rank.

**65.** Apart from the Technical Schools referred to above, facilities for higher technical education are available in a few more institutions. These have been established mostly by organized private efforts in or around Calcutta and have been receiving substantial assistance from the Calcutta Corporation. Along with the Calcutta Technical School, these form a class by themselves. Of these the Jadavpur College of Engineering and Technology easily ranks as the foremost. A brief account of the organization of this college is given below.

**66. College of Engineering and Technology, Jadavpur.**—The College of Engineering and Technology, Bengal, formerly known as Bengal Technical Institute, was founded in the year 1906 by the Society for the Promotion of Technical Education in Bengal. Its object was to train students for industrial pursuits as well as to develop and utilise the material resources of the country. In 1910, the Society for the Promotion of Technical Education in Bengal was amalgamated with and merged in the National Council of Education, Bengal. This also was founded in 1906 with the object of imparting and promoting education—literary and scientific, as well as Technical and Professional—on national lines and exclusively under national control—not in opposition to, but standing apart from, the existing systems of Primary, Secondary and Collegiate Education. The total number of



students on the rolls of the College was by the end of 1938 about 600. During 1941 the number was reported to be over 1,200. The College has established such a reputation that its students are now receiving increasing support from industrial concerns both in the Province and outside including the Tata Iron and Steel Works. Its students are also reported to hold important posts under the Government in British India and the Indian States and in the State and other Railways and in Municipalities and Corporations. Many are reported to have started independent business in manufacturing lines.

67. **Courses of study.**—The following courses are offered by the College:—

- (1) Mechanical Engineering Course (for five years).
- (2) Electrical Engineering Course (five years).
- (3) Chemical Engineering Course (five years).
- (4) Junior Technical Course (three years).
- (5) Survey and Draftsmanship Course (two years).
- (6) Agriculture Course (two years).

The minimum qualification for admission to the Engineering First-year class is either the passing of the preparatory examination of the National Council of Education or passing of the I Sc., examination of the University Admission qualification for the junior courses not rigidly defined

The College is under the control of an Executive Committee periodically elected

The number of students admitted into different courses and the number of students passed are given below:—

Courses.	Number of students admitted		Number of students passed.	
	1942-43	1943-44.	1942-43	1943-44
Mechanical Engineering Course	341	332	27	35
Electrical Engineering Course				
Chemical Engineering Course				
Junior Technical Course	76	72	30	14
Survey and Draftsmanship	36	26	18	6
Agriculture Course	3	4	1	1

#### D. University Departments of Technology.

68. Mention may, in this connection, be made of the facilities provided by the Calcutta University for post-graduate training in both Applied Chemistry and Physics. These classes are attached to the University College of Science and Technology. Both the Courses cover a period of two years after which the students have to sit for the M.Sc. degree examination in the respective subjects. At the Dacca University also similar facilities have been provided for post-graduate training in Applied Chemistry. A brief account of the courses of studies introduced in the two Technological Departments is furnished below:—

(a) **Department of Applied Chemistry.**—Besides the general subject of Chemical Technology comprising Organic Technology, Analytical Chemistry, Applied Physical Chemistry Measurements, Inorganic Technology and Chemical Engineering, the special subjects are taught:—(1) Applied Biochemistry, (2) Oil Technology, (3) Silicate Industries, (4) Therapeutic Chemistry, (5) Colour Chemistry and Dye, (6) Tanning, (7) Pigments, Paints and Varnishes. One of these subjects is taken by the students as their special subject. The practical work includes analysis preparation drawing of machinery and plants, and workshop practice.

(b) **Department of Applied Physics.**—For this course, the students are expected to possess sound knowledge of the general principles of Mechanical and Electrical Engineering subjects including fundamental advances made

in recent years and of the application of modern Physics to Electrical Engineering problems. The theoretical course consists of Applied Mechanics, Applied Thermodynamics (including Boilers, Economisers, Superheaters, Steam Engines, Steam Turbines, Internal Combustion Engine of different types) properties of materials, theory and practice of machine tools and appliances. This forms the background on which Electrical Engineering including generation of power, its transmission and its distribution are treated. Electrical measurements and measuring instruments form another subject of study. Communication including Telegraphy, Telephony and Radio Communication form the general framework. There are also provisions for the following special subjects:—

- (1) Meter and Instrument Engineering.
- (2) Line and Radio Engineering including the Design and Specification of Communication Apparatus and Equipments and different projects relating to telephone and Radio systems
- (3) Power Engineering consists of Power Station operation, transmission and distribution system as well as their design and specification
- (4) (i) Applied X-ray, *i.e.*, Application of X-ray method in general as well as in industrial practice.  
(ii) Applied Spectroscopy in its different branches
- (5) Industrial Engineering including refrigeration air-conditioning and Lubrication
- (6) Electro-thermic Appliances—the application of Electric Furnaces and industrial processes such as Arc Furnace, induction Furnace, Metallurgical and other operations as well as heating appliances of different types used in general industrial practice.

Along with these the subject of illuminants and illumination which comprises Photometry of different types with respect to oil, gas, electric lamps and the different uses in different interior illumination such as house illumination, factory illumination and exterior illumination such as the illumination of highways and roads, public places such as harbours, yards form the subject study.

(c) **The Practical Course.**—The practical course consists of an intensive course in Drawing, both mechanical and electrical, including projects, layout and distribution of power in its different aspects and of communication equipments in its different aspects and of communication equipments in its different branches. The use of machine tools of different varieties has been arranged for the practical work of the students. The different electrical machines are tested and examined regarding their performances. In the standardization laboratory, provision is made for the study of different measuring instruments and their performance, their calibration and standardization.

### E. Junior Technical Schools.

69. There are four organized Junior Technical Schools run by the Department of Industries at Barisal, Pabna, Rangpur and Bogra in addition to 10 aided schools distributed amongst various other districts. The following particulars about the Government Schools are furnished in the Departmental Report:—

Barisal—Artisan Class (3 years).

Pabna—Artisan Class (3 years), Amin Class (1 year); and Sub-Overseer Class (2 years)

Rangpur—Artisan Class (3 years); and Amin Class (1 year)

Bogra—Artisan Class (3 years)

In this connection it is necessary to make a passing reference to the origin of these schools. This helps to throw light on the characteristic features of the present organization and function of schools. *Prima facie* these appear

to include some incompatible subjects within their scope. Originally, those schools were run by the District Boards in a dozen important districts. All of them conducted artisan classes for giving training in carpentry, black-smithy, tin-smithy, etc., while 4 of them at Rangpur, Pabna, Rajshahi and Burdwan also conducted classes for the training of Sub-Overseers. In 1918 the 4 schools at Pabna, Bogra, Barisal and Rangpur were provincialised and placed under the Education Department. In 1922 the control of these 4 schools was transferred from the Education to the Industries Department.

**70. Management of Junior Technical Schools.**—The control of each of the Government schools is vested in a Managing Committee constituted as follows:—

*Chairman*—District Magistrate.

*Secretary*—Head of the Institution (known as Superintendent).

*Members*—Two nominated by the Magistrate, two nominated by the Municipality, two nominated by the District Board and two representatives of general public.

The District Engineer acts as an “ex-officio” member of the Committee. The aided schools in the various districts are managed by the District Boards of the respective districts.

**71. Curriculum and Training.**—The curriculum of the above schools is discussed in the following extracts from a Bulletin published by the Department:—

“It is proposed to give the necessary training in two types of schools—

A—Artisan Schools.

B—Junior technical schools, which will also include artisan classes.

These schools would be provided with properly equipped workshops and competent instructors and the course of instruction and prospects will be as indicated.

The artisan technical schools will train artisan in any one of the workshops, viz, carpentry, smithy, fitters' shops, machine shop, foundry, shoe-metal shop or electro-plating shop, etc. Parallel to this workshop training, they will have class teaching of about one period (either morning or afternoon) of three hours, once a week. The course, as at present in some centres, will extend to 3 years. The artisans are expected to turn out as mistries able to undertake repairs or manufacture in the line trained, or may seek for outside employment. The junior technical schools will follow a four years' course and the students will go through all or most of the above shops attending class lectures for periods of 3 hours each, twice a week. The technical students will be boys of intelligence who will be able, after training, to take up an industrial vocation using modern appliances and tools.

(a) They will be able to undertake work as contractors.

(b) They may establish the business of manufacturing furniture, sundry articles and implements for local consumption.

(c) They will be competent to handle the minor repairs of engines, agricultural implements, motor cars, sewing machines, cycles, pumps, etc

(d) If they like, they may proceed to further and more comprehensive Apprenticeship Training, involving a thorough workshop course and theoretical lessons. This training is now available at Kanchrapara, but admission is open only to those who have passed the qualifying examination. All students admitted are given stipends from about Rs. 40 to Rs 70 per month during the course of four years. The final prospects are foremen, supervisors, etc. But with a further course at Sibpur for two years for diploma or associateship, the students are expected to be qualified for officers' places in industrial concerns.

(e) They may incidentally appear at the City and Guilds of London Examinations in certain subjects, such as metal-plate working, cabinet making, etc. This certificate is recognized throughout the world, not to speak of different parts of India.

(f) As soon as the workshop classes in the junior technical schools are organized, industrial classes for a variety of subject such as cane-work, ricebowl making, knife-making, making of hinges, hooks, etc., will be started, involving a nominal additional cost. The student, after training in suitable shops preparatory to taking up an industrial class as particular subject will follow these classes for a year and will be expected to be able with a small capital to prepare and market these articles, which are already being made in Bengal and are finding a ready sale. Other subjects, even those not yet followed in Bengal, will be introduced later on."

The examination in these schools is conducted by examiners chosen by the Managing Committee and certificates signed by the District Magistrate are issued to successful candidates.

The curriculum of the aided schools is settled by the District Board with the approval of the Industries Department. Examinations in these schools are conducted by the District Boards and certificates issued to successful candidates are signed by the Chairman.

**Age of Admission and Minimum Qualification.**—Certain relevant details regarding the age of admission and minimum qualification of pupils admitted into the Junior Technical Schools for different courses of training are furnished here:—

Course of Training.	Minimum age.	Minimum qualification.
1. Sub-Overseer Class	.. 16	Must have passed the Matriculation or the School Final Examination.
2. Amin Class	. 16	Must have read upto Class IX of High School Standard.
3. Artisan Classes	.. 14	No restriction regarding educational qualification.
4. Survey Course	. 16	Must have passed the Matriculation Examination.

#### F. Monotechnic Institutes.

72 The institutions described in the above paragraphs are of the polytechnic model, although in some, particularly the Junior Technical Schools, some of the courses appear to have fallen into a moribund condition. The senior Technical Schools inclusive of the private Technical Schools and Colleges provide for diversified courses of training of both low and high standards. There are, in addition to such schools and colleges, a few institutions in this province of the monotechnic type. Their courses are restricted to the training of some specialised technique connected with particular industries. These institutions, either conducted or assisted by the Government, are enumerated as follows:—

- (a) Government Textile Institute, Serampore.
- (b) Government Silk Technological Institute, Berhampore.
- (c) District Weaving Schools.
- (d) Peripatetic Weaving Schools.
- (e) Other Aided Weaving or other Industrial Schools.
- (f) Bengal Tanning Institute.

All the above institutions, except the aided schools are controlled by the Department of Industries. Some important details regarding the objects and organization of these institutions and the courses of training provided are stated below:—

**(a) Government Weaving Institute, Serampore.**

**Courses of Training.**

73. The courses of instruction and training provided in the institute (established 1909) comprise—

- (i) Higher course (3 years), which covers instruction in all branches of textile technology and is intended for young men with a fair degree of education.
- (ii) Artisan Course (1 year) is meant for those who intend to work as handloom weavers.
- (iii) Women's Section (2 years), the course includes such subjects as handloom weaving, hand spinning, dyeing, calico printing, embroidery, sewing, etc.

The number of students admitted to the different courses of the Institute and passed during the years 1941-42 and 1942-43 were as follows:—

	Admitted.		Passed.	
	1941-42.	1942-43.	1941-42	1942-43.
Higher Course	127	138	120	125
Artisan Course	95	77	88	68
Women's Section	19	27	16	22

**Management.**—The Institute is under the administrative control of the Industries Department and is placed in charge of a Principal. There is a Managing Committee appointed by the Government that acts as an Advisory Board in regard to such matters as the award of stipends, preparation of budget estimates, etc.

**(b) The Silk Technological Institute, Berhampore.**

74. The Institute provides for the following two courses of instruction:—

- (i) Advanced Course extending to two years, and
- (ii) Artisan Course for one year only.

The number of students admitted and passed during the years 1941-42 and 1942-43 were as follows:—

Courses	Admitted		Passed.	
	1941-42.	1942-43.	1941-42.	1942-43.
Higher Course	19	22	9	10
Artisan Course	26	26	14	12

**(c) District Weaving Schools.**

75. These schools impart instruction in simple handloom weaving and dyeing free of any charge. The course of study extends over one year only. The number of students admitted for each year's course is limited to 20. Each of them is awarded a Government stipend of Rs. 4, per mensem. The schools are maintained jointly by the District Board and the Department of Industries. There are 9 such schools at Malda, Birbhum (Suri), Pabna, Bankura, Tangail (Mymensingh), Begumganj (Noakhali), Zorwarganj (Chittagong), Khulna and Dacca. It may be mentioned that the Dacca Weaving School provides for an extended course of two years.

The number of students admitted and passed during the year 1941-42 and 1942-43 were as follows:—

	Admitted.		Passed	
	1941-42.	1942-43	1941-42	1942-43.
Bankura .. .. .	20	20	17	17
Malda .. .. .	24	20	20	18
Pabna .. .. .	23	17	20	19
Tangal .. .. .	27	30	20	20
Noakhali . . . . .	30	20	27	25
Suri . . . . .	19	20	24	17
Zorwanganj . . . . .	20	24	20	17
Khulna .. .. .	23	27	17	12
Dacca . . . . .	15	18	4	11

#### (d) Peripatetic Weaving Schools.

76. These schools impart a short course of instruction free of any charge in handloom weaving for 4 months only to the boys of weavers and others in their actual homes in the interior villages of Bengal. Each student is awarded a Government stipend of Rs. 4 per mensem during the training period. There are 26 such schools under the control of the Department of Industries. The District Boards contribute a part of the cost of maintenance of these schools.

#### (e) Aided Weaving and Other Industrial Schools.

77. The number of these schools was 110 in 1942-43 of which 25 were for girls.

A number of subjects are taught in these schools such as carpentry, weaving, sewing, tailoring, cane and bamboo work, lace making, chutney making, etc.

The aid is granted on the approval of the District Collector.

#### (f) Bengal Tanning Institute.

78 The object of the training provided for in this institute is to qualify one to pursue the tanning trade. There is accommodation for the training of 24 students at a time, out of which 16 seats are reserved for students of Bengal and 8 for those of Bihar.

The minimum qualification of candidates seeking admission is the passing of Matriculation Examination of the University of Calcutta or similar examination of any other University. Non-matriculates may also be admitted, if they have connection with hide or leather industry.

The course is one of two years. One year is devoted to work in the demonstration tannery and the other year at the Chemical Laboratory. At the tannery, students are taught the methods of manufacturing the principal varieties of commercial leather, e.g., leather for shoe uppers, sole harness, bags and trunks, fancy leather articles, belting, picking bands, laces, etc. The students are given facilities to practise every operation whether manual or mechanical, with their own hands in order that they may get acquainted with necessary details. At the laboratory, they are taught the methods of industrial chemical analysis of water, soap, oils and fats, vegetable tanning materials, other chemicals used in tanning, dyes, leather, etc. Recently a certificate course in tanning has been introduced with the approval of Calcutta University.

The Institute possesses a shoe and boot making department located at the premises of Calcutta Technical School

No tuition fee is charged, four stipends are granted by the Government of Bengal, two senior stipends of Rs. 30 per month to Science Graduates who had taken Chemistry as one of the subjects for graduation and two junior stipends of Rs. 20 per month to under-graduates.

The number of students admitted to the Institute and passed during the years 1941-42 and 1942-43 were as follows.—

	Admitted	Passed
1941-42	44	36
1942-43	44	36

### C. Other Institutions for Technical Training.

79 **Bengal Survey School, Comilla (Survey Education Advisory Board).**—The courses of training provided for in this school are as follows.—

- (i) Survey Final Course (2 years).
- (ii) Amin Course (1 year).

There are also arrangements for special classes for (a) training of candidates sent by Divisional Commissioners for appointment as district Kanungos and (b) training of Casual students.

The training for the Survey Final and Amin Courses is controlled by a special board known as "Survey Education Advisory Board". The Director of Land Records and Surveys, Bengal, is the President and the Inspector of Technical and Industrial Institutions, Bengal, the Secretary of the Board.

Besides the Bengal Survey Schools, the Junior Technical Schools at Rangpur, Pabna, Rajshahi and Burdwan are affiliated to the Board, but for Amin Courses only.

The number of students admitted to the school and passed during the years 1941-42 and 1942-43 were as follows:—

	Admitted	Passed
1941-42	59	..
1942-43	53	..

### Departmental Expenditure on Industrial Education.

80. **Government expenditure on industrial education in Bengal.**—A review of the present system of industrial and technical education in Bengal will not be complete without a reference to the funds that are spent from the provincial exchequer for the promotion of such education. An idea of Government expenditure on technical education may be obtained from the following data.—

(I) Under the Department of Industries—

	1940-41.
	Rs.
Technical and Industrial Schools	.. 3,20,623
Inspection	.. 17,505
Scholarships	.. 55,281
Grants-in-aid	.. 2,30,587
<b>Total</b>	<b>6,23,996</b>

(II) Under the Education Department—

Engineering and Survey Schools	.. 4,18,515
Schools of Arts	.. 48,500
Commercial Institute	.. 62,000

**Total** .. 5,29,015

**Grand total** .. 11,53,011

81 **Average cost of technical education per student.**—It would be interesting if an average cost of technical education per student in Bengal could be worked out. But since the supervision of technical and industrial

education is divided between the Department of Industries and the Department of Education and besides, there are a large number of private institutions imparting such education, it is not possible to arrive at an all-Bengal average. It is, however, possible to take a few typical institutions and calculate the average cost per student. For this purpose the four junior Technical Schools under the direct control of the Department of Industries may serve as useful models. In their cases the average cost per student works out as follows:—

Name of place	Total Expenditure inclusive of stipends allowed but exclusive of capital cost.	Government contribution.	No of students, on 31st March 1939.	Average cost per pupil.
	Rs	Rs.		Rs
Pabna	19,780	13,207	76	260
Barisal	12,207	12,130	65	187
Bogra	12,921	12,664	64	202
Rangpur	19,220	13,492	84	226

The position shown in the above table may be compared with that of the technical schools at Lucknow, Gorakhpur and Jhansi in the United Provinces, for which the following figures were furnished in Mr Abbot's Report for the year 1937:—

Name of place	No of pupils	Actual net expenditure inclusive of capital cost	Average cost per pupil.
		Rs.	Rs
(a) Lucknow	344	1,30,998	381
(b) Gorakhpur	209	45,088	215
(c) Jhansi	70	20,209	289

It is interesting to compare these costs with the average cost per pupil of 42 Junior Technical Schools in England calculated in 1936. This amounted to £23-2-0 (Rs. 308) per pupil.

## CHAPTER IV.

### Technical Education in relation to General Education.

82. **Need to examine relationship between General Education and Technical Education.**—We have so far reviewed the endeavours and enquiries that were initiated from time to time in order to assess the needs of technical education in this country and the various suggestions and schemes that had emanated therefrom. We have also surveyed the existing system of technical education in Bengal. Before we proceed to suggest positive measures for improving the existing state of things so that thereby the basis of a sound system of technical education may be laid in Bengal, we feel called upon to explain and elucidate in the present chapter the real relationship between general education and technical education. The main purpose of dealing with this aspect of technical education at this stage is to remove the misunderstanding which generally prevails as to the real role of general education and that of technical education in social life.

83. The patent fact to-day is that technical education has all along been and is still regarded as an inferior type of instruction which possesses no higher aims than equipping young people with some knowledge about professional skill. This restricted interpretation of technical education is due to an inadequate appreciation of the true import and aims of technical education in this country, and it has failed to secure any good social status for those who have pursued it and consequently, the progress of technical education, in spite of its utility and urgency, has been seriously retarded. At the earlier stages general education in the universities which enable



the young folks to become civil servants, judges, magistrates, lawyers and leaders of men naturally held up a lure to the new generations while institutions of technical education began to grow up in neglect like wild shrubs, unable to attract much attention of the Government or of the people. Young people with parts and good promise were never attracted to them until in recent years. But in course of time the great utility of technical education has come to be recognised by the sheer logic of economic factors and its real significance and scope have been very much widened. It is, therefore, pertinent at this stage to elucidate the contents of technical education *vis-a-vis* general education.

84. **Changes in the purport and import of technical education.**—Formerly technical education was regarded as an instruction which had a direct reference to the career of a person who received it or as a study of the principles underlying any kind of human craftsmanship. The Simla Educational Conference of 1901 defined technical education as (a) the study of the scientific methods and principles underlying the practice of any handicraft, industry or profession, and (b) the application of those methods and principles to the practice of the handicraft, industry or profession. These definitions no doubt touch upon some salient features of technical education, but they do not state the main objective and the important role which it is intended to play in the entire scheme of education for the young. Although the primary object of technical instruction has been stated to be to satisfy the needs of industry and commerce for (1) skilled craftsmen, (2) intelligent foremen and executives, and (3) research workers, the ultimate objective is much wider and more comprehensive in relation to larger spheres of human life. Progress of knowledge and ideas, and extension of human requirements in the various spheres of social activities have widened the sphere of technical education also and have imported to it a new meaning and a new scope for training human faculties in a manner and to the extent required by the changing world. Mr. John Sargent in his memorandum on Technical Education referred to some of these changes as follows:—

“The obvious lesson implicit in these changes is that technical instruction to-day must be a wider and more liberal form of training than it has been in the past, it must comprehend the scientific principle underlying the processes of manufacture as well as the processes themselves; it must link up the science of production and business organization with the arts of design and salesmanship. It must take cognisance also of social science in relation to the effect of industrial development on the life of a previously non-industrial community and it cannot even neglect the provision of purely cultural and recreational facilities as an antidote against mental and moral stagnation for those workers who are destined to remain the semi-skilled servants of the machine.”

85. **Conception of education.**—The general idea that technical education is something apart from general education having no intimate relationship with it and bearing a limited utility for those young men who seek a career in trade, commerce and business, grew out of the almost universal homage which the society paid to higher general education in colleges and universities and there were reasons also justifying this attitude, relative to the cultural environment and requirements of that age. But circumstances have changed and are changing in such a radical manner that the ideas about the correlation of technical education with general education have to be redefined now. In reality the basic conception of education itself has undergone such changes due to the psychological researches and progress of science that the old doctrine that education is nothing more than the discipline of faculty and the culture of character by means of only liberal education does no longer hold good. The Royal Commission on Secondary Education

(1895) in England, therefore, appropriately offered the following definition of education which has also been approvingly quoted in the Spens Report on Secondary Education (1938):—

“All education is development and discipline of faculty by the communication of knowledge and whether the faculty be the eye and hand, or the reason and imagination, and whether the knowledge be of nature or are, of science or literature, if the knowledge be so communicated as to evoke and exercise and discipline faculty, the process is rigidly termed education.”

The fundamental object of education is thus the development and expansion of human faculties, no matter whether by technical education or general education, so that by reason of the knowledge and experience gained thereby, the person whether a boy or a girl may become a worthy member of the society and perform his or her functions and responsibilities efficiently in the particular sphere in which he or she may be placed. Hence the concept of education involves the process of intellectual training and personal discipline conducted with a special regard to the career or the profession or trade to be followed in life.

**86. Technical education is an extension of general education.**—It would thus be evident that the difference between technical education and general education and more particularly secondary education is not really one of kind or character, but of emphasis. In a large sense, it is complementary to general education. As the Royal Commission (1895) analysed, we may even term secondary education as also technical to a large extent and in a wider sense “Inasmuch as it teaches the boy”, observed the Commission, “so to apply the principles he is learning, and so to learn the principles by applying them or so to use the instruments he is being made to know, as to perform or produce something, interpret a literature or a science, make a picture or a book, practise a plastic or a manual art, convince a jury or persuade a senate, translate or annotate an author, dye wood, weave cloth, design or construct a machine, navigate a ship, or command an army,” secondary education partakes of the functions of technical education. Hence general education is the genus and technical education the species which is to be conducted in view of the special life that has to be lived with the express purpose of equipping a person with the necessary knowledge and experience for living it worthily and efficiently.

**87. Unity of technical education and general education.**—It should thus be recognised that even in the objects for which general education or technical education stands, there is no essential disunity between the two. If general education imparts culture, technical education also does so, but in the latter case the cultural outlook becomes more practical and realistic than that promoted by general education. The essential role of education is to create in a boy or a girl alertness of mind, intellectual enterprise, breadth of vision, self-confidence, self-discipline, fortitude and a knowledge about man and affairs, so that he or she, however placed in life, may face the realities of the world with courage and determination and advance along the path of life by dint of the abilities that he or she acquired from a regulated course of education. These are the qualities which are stimulated by technical education and general education alike in varying degrees. Technical education is thus in no way inferior to general education, for it now embraces a greater portion of human life than previously.

**88. The comprehensive scope of technical education.**—How far technical education covers human life in the complex world of to-day has been generally indicated in paragraphs 84-86 above. The stage when technical education was looked down upon by the Society has almost passed away and now the growing complexity of social life should make it imperative enough to organise a system of technical education in such a manner that the needs of the trade, industry and commerce underlying all of which is the economic welfare of the people may be adequately and suitably met. We have

reached a stage when the country can no longer afford to run its trade and industry by mediocrities alone. Formerly the lure of higher education attracted the best brains of the country, and necessarily the economic development of the province was sadly neglected—a task which should claim the services of the best and the ablest in the country. The role of technical education is, therefore, a responsible one and can in no way be looked down upon, simply because it does not teach higher philosophy of life, æsthetics, poetry or things like that.

**89 Spreading influence of technical education.**—It thus appears that the spreading influence of technical education on the various aspects of modern life is unmistakable. Progress in sciences brings more and more technical details into human life which have to be known, if not mastered, if one wants to live in complete harmony and peace with the advancing world. In fact no individual, however, conservative in outlook or by temperament can successfully stem the tide of progress. If he tries to do so, he becomes a misfit—a round peg in a square hole and his whole life is bound to be futile struggle against imaginary wrongs. Such cases are more or less exceptions and the essential thing before the society to-day is to equip its rising generations in such wise that they can march along abreast of the times. This is imperative enough not only in the sphere of abstract thinking, but also in trade, industry, commerce and business. Since commerce and business pervade through modern life, any course of education which does not impart knowledge about the principles underlying the activities in these spheres cannot be complete or perfect to that extent. The supreme necessity of technical education and its wide utility are thus clearly emphasised. These considerations should demonstrate that there is really no antithesis between general education and technical education, for they perform their respective role as two complementaries and produce what we may call real manhood which is the most powerful factor in shaping the destiny of each nation. While liberal education creates a liberal outlook, a sense of artistic beauty, higher conception of life, etc., in those who may like to pursue them, the role of technical education also is no less important inasmuch as it imparts to the learners a realistic approach to every form of art and knowledge. It is not, however, suggested that the two types of education may or should be pursued concurrently or are mutually exclusive. In the first place, it should be borne in mind that every form of specialised education must have a good foundation of general education, which in other words means that there should be a definite stage in the life of a learner up to which general education with or without a slight technical bias in the curriculum should be exclusively imparted and after that diversion towards technical studies may commence.

**90. Need for a proper relationship with general education.**—The above considerations, it would appear, emphasise the need for evolving a proper relationship between general education and technical education. There is thus a distinct need for a harmonious system of education in Bengal in which the varied educational needs of the people may be suitably and efficiently satisfied. Since our task is to outline the steps which may lead to the establishment of such a system through gradual stages, we cannot possibly ignore the aspect of general education entirely. But we are not required to go into the problems of general education as such. We are concerned only with that part of general education which is closely linked with the system of technical education. We mean the basic education which is essential for whatever system of technical education we may like to evolve. Since there is a growing demand for imparting a more practical bias to primary and secondary education, we should aim at such a system of technical education in correlation with general education that it may serve its ends with the maximum efficiency. We, therefore, envisage a new curriculum of studies on the side of technical education and a few reforms on the side of general education in order to accommodate the former most harmoniously.

91. **Need for a few reforms in the existing system of General Education.**—It is generally admitted that although general education has developed much more extensively than technical education, it is not immune from deficiencies. For our purpose, we feel that reforms in the following directions are urgently called for in order to provide a scientific basis for the system of technical education we have in view:—

- (a) A system of universal compulsory and free education for all boys between 6 and 14 should be introduced as speedily as possible, for unless this is accomplished the system of technical education cannot have a sound basis to thrive upon; the medium of instruction should be vernacular.
- (b) The curriculum of studies for education from 6 to 14 should be so planned that along with theoretical studies regarding literature, history, geography, etc., a practical bias may be imparted by the introduction of some course of training in sciences including drawing and in some handicrafts
- (c) There should be a common curriculum of studies from 11+ to 13 in general High Schools and Technical High Schools and should have a more technical bias, so that the aptitudes of the students may be watched and adjusted. At this stage interchange of careers from general High Schools to Technical High Schools or *vice versa* will take place. A suitable machinery to be set up to advise such interchange of careers
- (d) The Secondary Education stage should correspond to classes IX, X and XI so as to make it more comprehensive. This will lead to the next stage, namely, the University, and will thus involve the abolition of the Intermediate classes. The second stage in the system of technical education which we are visualising will then correspond to this stage in the general High School and comprise classes IX, X and XI—Pending the proposed reforms the stages of technical education will correspond to the stages of general education as obtaining to-day.

The implications of these suggested reforms in so far as they affect the system of technical education will be referred to in Chapter VI

91A. **Technical Education and Recreational Activities.**—Since technical education should claim to develop healthy manhood, character and personality, there should be ample provision for playing grounds, sports clubs, libraries and other social activities, in case of every technical and industrial institution.

## CHAPTER V.

### Technical Education in relation to trade and industry.

92. **Technical education stimulates industrialization.**—An orderly economic development of a country is primarily dependent on the supply of specialised knowledge, skill and experience, besides, of course, capital and enterprise. Unless skilled craftsmen, intelligent foremen and executives and research workers are available in a steady and unflinching flow, the economic progress of any country is bound to be halted. The history of economic progress in every advanced country bears ample testimony to the fact that rapid development of industries or trade and commerce was possible mainly because of the development of a supporting system of technical education suited to their needs. In Germany, for instance, the study of applied chemistry largely contributed to the wonderful development of chemical industries in that country. In Belgium important experiments in technical education which were initiated in the middle of the 14th century were productive of admirable results in so far as the promotion of industries was concerned. In England, of course the development of technical education lagged behind other countries although her industries had developed

considerably; but she made up her lost time by energetic reforms, after a number of Commissions and Enquiry Committees had been set up from time to time to report on the systems that would be suitable for the country. In Russia also attempts had been made by Government to encourage the growth of mechanical and manufacturing skill. The two great Imperial Schools at Moscow and St Petersburg had long been classed as the best equipped State Institutions to give technical training, although the country as a whole was not far advanced in industrial pursuits. In Japan again the gradual evolution of a spreading system of technical education gave a powerful support to her hectic industrialization. These few instances only point to the need for technical education as a stimulating factor for industrial progress in every country.

**93 Technical education and industrial development.**—The point whether technical education should come first or should follow the growth of industries has been much discussed. The experience of different countries may not provide a categorical reply to such a discussion, for in the nature of things some countries must have to begin some time and somewhere so that other countries coming late in the industrial sphere might draw upon their experience and knowledge. We feel, therefore, that when a number of countries have already achieved considerable industrial progress and reached almost the saturation point, the question of what follows what need not seriously trouble any new country aspiring after an industrial career. In our opinion, only two considerations should be pertinent in this case, viz—

- (1) whether the existing and potential resources of the country are such as to warrant a go-ahead industrial development; and
- (2) whether the people of the country possess at the moment such a standard of general education and intelligence, so that the courses of technical studies ranging from the lowest to the highest may be mastered by the young students and may later on be usefully utilised by them.

Applying these two considerations to India, we may reasonably conclude that India satisfies the conditions eminently well. It may even be urged that India's industrial development has already reached a respectable level. Even on the basis of the number of industrial workers, India is reckoned as the fifth industrial country in the world. So India's conditions are fully ripe for the introduction of an elaborate system of technical education, so that her industrial progress may be more rapid and orderly in accord with scientific principles. Most of the enquiries on technical education in India as already indicated offered suggestions which were tempered with a note of caution, explaining that India's industrial progress was not so large or far-reaching as to warrant the introduction of an elaborate system of technical education. In the report of the enquiry held by Lt.-Colonel E. H. Dev Atkinson and Mr. T. S. Dawson, the following remarks occur:—

“During recent years there has been a continuous and insistent demand from all parts of India for the extension of technical education and proposals for the establishment of institutions for teaching the most varied subjects have been made. The examples of England, America, Germany and Japan have been freely quoted as possessing numerous colleges and schools, and as affording various facilities for technical education and scientific industrial training. It seems to be forgotten, more often than remembered, that these countries possess a wealth of manufacturing factories and workshops, which India does not possess and in them, the growth of manufacturing factories and workshops, preceded the establishment of technical schools and colleges. Nevertheless a large portion of articulate India opinion seems to understand that if only a sufficient number of technical institutions are established and sufficient number of men are trained to take up appointments as managers, foremen, etc., the establishment of manufacturing concerns must follow, and the industrial regeneration of India will be assured.

If it is admitted that in every other country technical education has followed the organisation of industries, or grown up alongside with them, and may be said to be the necessary complement to industrial efficiency, it is obvious that in a country where few industries are established, the wholesale education of Indians could only result in an excess of young men trained up for posts which do not exist, and for whom no suitable occupation can be found."

Again, Mr A Abbott in his report on vocational education in India observes as follows —

"Industry in India is usually carried on in small undertakings, the volume of large scale industry being very small considering the immensity of the population. The number of great industrial undertakings is, in fact, not yet sufficient to make full use of the natural resources of the country for the good of the nation as a whole. Although we are not directly concerned with economic questions in this inquiry, it is relevant for us to point out a serious difficulty which confronts the various provinces in planning their industrial development.

No country can initiate and carry on industries on a large scale unless it has an adequate supply of men specially trained for the direction and management of large industrial concerns, as well as of others specially qualified for the minor but very important, supervisory posts in them. On the other hand it cannot be expected that capable and ambitious men will devote themselves to acquiring this special knowledge and skill unless they see a reasonable prospect of exercising it and gaining a decent livelihood thereby. While many men will face an adventure, comparatively few will join a forlorn hope, on whose success or failure their whole fortunes and those of their wives and children are directly dependent

It is for this reason that we are of opinion that the expansion of vocational education in India should be begun with caution and with full regard to the development of organised industry. It would be a great misfortune if a large body of men received a prolonged technical training and on its completion found that they had no opportunities of using the knowledge they had acquired."

94 **Excessive caution leads to stagnation.**—While there are some elements of good logic in the viewpoints contained in the observations quoted above, it should be stated that by reason of the conditions that appertain in India, she can afford to pursue a less cautious and a more progressive policy in regard to technical education. The reference to the large surplus of unemployed young men produced by universities in India is not really pertinent to the case of technical education. The very fact that university education has led to a surplus production of unemployed or unemployable young men emphasises all the more the need for an expansive system of technical education which can alone lead to an expansion of economic opportunities for our young men. There is no doubt a vicious circle; at least it looks like that. But if we consider the predisposing causes that have led to the present position and to which reference is often made, we shall find that at the very beginning there was some defect in the scheme of things. At the start Indian students were not given the opportunity they required to learn the ins and outs of technical jobs and there was also the conservative policy of the Government which did not give any active support to the development of industries. If trade and industry did not grow at a fast pace, one of its main causes was the non-existence and non-availability of suitable facilities of technical education and if such facilities were not adequately available to the young men of our country, it was largely due to the unsympathetic attitude of the trade and industry. To this however, we shall refer again. We are thus definitely of opinion that excessive caution does not lead to progress. It is a doctrine as good as the doctrine of letting things take their course. But in these days, intelligent planning of vocations and of national resources either material

and human is indispensable. In peace times much difference due to inadequate or haphazard growth of economic opportunities may not be noticeable, but in abnormal times the economic deficiencies of a country become demonstrably revealed. At the present time, for instance, the dearth of technicians in India is proving a hampering factor to the war activities of the country. We have come to realise how inadequately the country is equipped as regards technical education. That is why the Bevin Training Scheme, the War Technicians' Training Scheme and many other schemes have had to be initiated. These are at best improvisations; but had we planned ahead and had we assessed the needs of the country in a rather scientific manner, the conditions of India might have been happily very different.

**95. Assessment of needs.**—While decrying a policy of conservative caution, we do not, of course, mean to suggest that progress should be achieved merely for the sake of progress without regard to the requirements of the country and at any cost. We admit that there should be a correct survey of the needs of the country prior to the inauguration of any far reaching schemes or plans with regard to any measures, not to speak of technical education. The necessity for such an assessment of needs was rightly stressed by Mr. Abbott in the following words:—

“The creation of a suitable system of vocational education, which produces annually a sufficient number of qualified recruits for each branch of industry and commerce and does not leave a number of potential recruits unemployed demands that every province shall make an industrial survey, in order to determine the types of instruction to be provided, the stage to which the studies in each type shall be carried, and especially the number of recruits which can be absorbed. In an old industrial country, this is not vitally necessary since parents can usually estimate with some approach to accuracy the prospects of employment of a suitable kind for their children. but even in such a country, regular surveys of the field of potential employment would have value. In India whose industrial and commercial organisations are not yet highly developed surveys of this kind would be even more useful; they are indeed essential, if there is not to be either waste of efforts and consequent disappointment or an inadequate supply of men trained vocationally. Our task of advising on vocational education has been hampered by the lack of these surveys, for our investigation is just as much industrial and commercial as it is educational.”

**96. Survey of needs should be comprehensive in all details.**—We endorse the viewpoint quoted above but one thing needs emphasis in this connexion. The assessment of the needs of the country is no doubt desirable, but such assessment should be made with an eye to the potential requirements of the country. We should not only take account of the existing industries and existing organisations and their absorbing capacities, but also the fact that new industries may come into existence and new organisations may be set up offering thereby new avenues of employment. Exactness may not and in fact cannot be achieved in such estimates, but having regard to the conditions of the country and our aspirations, we must provide for more men than can possibly be absorbed by the available opportunities at the present moment. So it should not be regarded as an error to push on the expansion of the facilities of technical education even in excess of present requirements, for the country is vast and its potential resources also expansive so that we may reasonably look ahead for the development of industry and trade in a progressive scale.

**97 Difficulties in assessing requirements.**—Although the need for an assessment of requirements is very important and essential, the problem is indeed very difficult and onerous. We may succeed in ascertaining the number of people employed in different factory industries, but we are not

exactly aware of the employees in those industrial establishments which just fall short of factory legislation. Again, there are numerous small-scale cottage units employing thousands of people about whom no statistical data are available. We should certainly take particular care in obtaining the statistics of the number of employees and of the average number of annual vacancies that are filled up in these industrial units. Then there is a formidable difficulty offered by the stubborn unwillingness of industrial establishments in giving out such employment data and also by the unreliable nature of the data furnished by them. We have endeavoured to obtain as much information as we could, but the response that we have received so far is not very satisfactory, although we feel that we have found some sort of a basis for framing our recommendations. In view of these difficulties, it is our considered opinion that there should be a provincial Statistics Act more or less on the Collection of Statistics Act passed in Central Provinces, but not yet put into operation, so that in Bengal the collection of essential data may be facilitated. The Central Statistics Act passed in 1941 has been put into operation all over India, but its scope is too much restricted to be of any use for the purpose.

**98. Requirements of Industries.**—Since technical education is ultimately a question of recruitment for the industry, trade and business, the quality and adequacy of the number of recruits are most important considerations in any scheme of such education. We shall presently discuss the problems as to how the quality and excellence of recruits can be improved and ensured according to the varied needs of industry and trade. As regards the quantitative idea of the possibilities of annual recruitments, we have some tentative but interesting figures collected a few years back, by the Employment Adviser, Bengal, which are as follows—

**Consolidated Figures of Employment in Bengal.**

Name of Industry or Trade	Bengalees	Non-Bengalees	Total	Percentage of Bengalees.	Percentage of non-Bengalees.
Cotton Mills . . . . .	18,740	12,541	31,281	60	40
Jute Mills . . . . .	49,668	154,149	203,817	24	76
Cotton and Jute Presses . . . . .	18,692	11,984	30,676	61	39
Paper Mills . . . . .	2,541	4,628	7,169	35	65
Rubber Factories . . . . .	2,420	1,924	4,344	56	44
Glass Factories . . . . .	367	1,981	2,348	16	84
Cement, Lime and Pottery Factories . . . . .	2,616	1,429	4,045	65	35
Battery and Dry Cell Factories . . . . .	253	663	918	28	72
Aerated Waters and Ice Factories . . . . .	136	772	908	15	85
Pen and Pencil Factories . . . . .	530	302	832	64	36
Salt Factories . . . . .	332	52	384	86	14
Aluminium and Enamel Works . . . . .	1,074	1,656	2,730	39	61
Leather and Shoe Factories . . . . .	2,751	1,312	4,063	68	32
Paint, Colour and Varnish Works . . . . .	690	1,024	1,714	40	60
Chemical and Pharmaceutical Works . . . . .	3,264	2,211	5,475	60	40
Soaps Works . . . . .	583	537	1,120	52	48
Kerosene and Petrol Installations . . . . .	1,072	808	1,880	57	43
Fan and Electric Works . . . . .	1,179	396	1,575	75	25
Match Factories . . . . .	1,596	2,978	4,574	35	65
General Engineering Workshops . . . . .	19,936	15,769	35,705	56	44
Electric Supply Companies . . . . .	1,774	3,452	5,226	34	66
Silk Mills . . . . .	555	1,693	2,248	25	75
Sugar Mills . . . . .	947	1,219	2,166	44	56
Tea Estates . . . . .	4,596	86,952	91,548	5	95
Collieries . . . . .	14,727	10,412	25,139	59	41
Plumbing Trade . . . . .	72	1,570	1,642	5	95
Automobile Engineering Workshops . . . . .	1,074	538	1,612	67	33
Motor Transport Business . . . . .	11,340	24,741	36,081	31	69
River Transport Business . . . . .	327,101	37,293	364,394	90	10
Film Companies . . . . .	479	402	881	54	46
Insurance Companies . . . . .	1,856	576	2,432	76	24
Banks . . . . .	2,252	1,215	3,467	65	35
Gas Companies . . . . .	225	1,255	1,480	15	85



These figures give an idea of the existing employment and indicate also the average vacancies that occur in the various lines covered by the Report. But these figures have their limitations. In the first place, they do not represent the entire field of employment in Bengal, for all units in each line of industry or trade did not submit their data, and besides the consolidated statement was entirely based on whatever data the firms themselves voluntarily submitted. Further the above statistics relate to all categories of workers in industrial establishments. So we should accept them with the reservation that the volume of employment available in this province is at least 50 per cent. more than what is indicated by the above statement. Further the large percentage of non-Bengalee workers including non-Indians in certain lines is indeed significant and suggests the potential scope for the absorption of a large number of Bengali young men.

99. **Correlation of needs with annual outturn.**—The task of correlating the annual outturn of technical institutions with the requirements of trade and industry is, of course, very difficult, for since exact data are not available, we cannot calculate the chances with any mathematical precision, but since we feel that we should expand the facilities of technical education in terms of possibilities, we should aim at producing technicians even in excess of ascertained needs. This is justified by the potentialities that our industry and trade appear to hold out. In this connection, the observations by the Principal of Jadavpur Engineering College may be quoted as being relevant:—

“The time has come when the outlook and prospects of technical education in the province should no longer be allowed to be dominated by available opportunities for employment in Government or private service. The admissions at the Engineering College at Roorki, which for many years was the premier institution of its kind had all along been guided by this principle, and it had attracted some of our best talented young men from all over the country. Unfortunately the engineers turned out by this institution were so much absorbed by the pre-occupations of the Government services into which they entered that the training which they received failed to make any lasting impression in the country by being harnessed to any constructive endeavours in the furtherance of the industrial development of the country. *Prima facie* the restricted admissions in this college would seem to be justified by the limited prospects of appointments in Government service, but hardly any purpose of nation building significance is served by this kind of adjusting supply of technically trained men to demand such as is offered by the prospects of available jobs either in Government or in private service. Taking a long view of the situation and having due regard to the needs of the industrial development of the country, it should be our policy, at least in respect of institutions like Jadavpur College, to turn out a larger number of technical men than can possibly be absorbed in the available services even at the risk that some of them may not find any opportunities at all for employment. For it is expected that to some of these young men the state of employment would act as an effective incentive for starting independent business in industrial lines, for which the training given to them at the Jadavpur College should stand them in good stead. As a matter of fact some of the ex-students of the College have embarked on industrial ventures of their own with very encouraging results, the most notable instance among these being the Bengal Electric and Lamp Works, which has been manufacturing electric bulbs and has already earned a reputation in the line ”

We feel that in planning our system of technical education, we may reasonably take up this viewpoint.

100. **Technical education according to different requirements.**—It need not be disputed that the organisation of technical education and its curriculum cannot be standardised for all types of industries, trade or professions. The needs are evidently divergent and provision must be made to meet these by the introduction of different curricula at different stages, either in the same institution or in different institutions. For our purpose, we may classify the types in the following broad categories:—

- (a) Cottage industries;
- (b) Small-scale industries;
- (c) Large-scale organised industries;
- (d) Agricultural vocations; and
- (e) Commerce and business.

In each category there are no doubt grades and subdivisions requiring varying emphasis or specialization. Besides, the same institutions may cater to the needs of several of these categories. We do not propose to go into further details at this stage. The subject will be dealt with in some details in subsequent chapters. For the present purpose we leave it by just saying that technical education has varying aspects none of which a nation can ignore without running grave risks.

101. **Technical education should inter-link institutions and factories.**—There is another important aspect of technical education which needs some emphasis. Technical training to be of any effective value in the practical fields must have behind it practical experience in factory conditions. If technical education consists in mere imbibing some theoretical principles, in schools and colleges, it has a very limited value. It is often supposed that a mind stored with facts and principles would of itself work out their applications at the first opportunity of practical employment; but the fact is that pure science such as is studied for the love of it, is quite inadequate to help a man through the difficulties of a complex trade or manufacture, unless his mind is supplied with the various links which connect principle and practice. Indeed it is so difficult to render technological teaching perfectly practical without actual practice that even anticipations founded on very carefully specialised studies are sometimes falsified in factory or workshop. It would thus appear that technical education is not a matter for the school alone. It is not possible for each school or institution to organise factory conditions so as to teach with precision all that is required to be known about an industry or an important branch thereof. There is, therefore, a clear necessity for a close and continuous collaboration and contact between institutions of technical training on the one hand and industry and trade on the other.

102. **Past experience regarding co-operation between technical education and industry.**—But unfortunately the extent of co-operation rendered by the industrial and commercial firms to technical institutions in Bengal so far has not been anything about which we may feel happy. The evidences collected and printed in the report of Lieut.-Colonel E. H. DeV. Atkinson and Mr T. S. Dawson on their enquiry to bring Technical Institutions into closer touch and more practical relations with the employers of labour bear an index to the attitude generally held by private industrial and commercial firms in the matter of extending facilities of apprenticeship training or taking in recruits. There were, of course, a few firms which promised full co-operation, but the majority of the firms whose evidences were recorded refused support or assured scanty and limited support on one or other of the following grounds:—

- (a) That Indian boys are not capable of holding responsible jobs and controlling unruly employees;
- (b) That Indian boys are not hard working and painstaking;

- (c) That they had a fixed policy in regard to recruitment which could not be changed.

These views were expressed some 30 years back but they represent to a great extent a true picture of the attitude of many firms even to-day as evident from the replies received to our questionnaires. But from these it appears that the much needed collaboration between education and industry was very much limited. In fact most of the non-Bengali firms including non-Indian firms have all along followed a policy of patronising their own people imported from abroad or other provinces. In the case of non-Indian establishments, all superior services have remained a reserve for their own men, no matter whether they are well qualified or not, while Indian students with equal or better qualifications have been denied any suitable opportunities. Even if they received any jobs, they were of an inferior grade. This policy was motivated by their studied distrust in the capacity of Indian boys and a deliberate policy to keep out Indian boys from superior grades of services. The contention that there were not adequate opportunities for Indian boys in trade and industry and so technical education should not expand was and is still an unconvincing argument, for if youngmen imported from England with or without any technical training were absorbed, there was hardly any point in arguing that there were no technical opportunities. In reality Indian boys did not receive the encouragement they deserved, for about their capacity and efficiency, no serious complaint was indeed entertained. The European firms did not also consider the fact that had they patronized the Indian boys, it would mean less costs in their management. But it was their deliberate policy to discourage Indian boys and to weave arguments to justify that policy. We want to emphasise this fact here with the explicit purpose that the stigma which attached and still attaches to some extent to Indian students regarding their capacity and efficiency had no justification whatsoever. What we state in regard to non-Indian firms should also be repeated in the case of the non-Bengali industrial establishments. They also have followed and are still following a policy of importing kinsfolks to fill up important posts irrespective of the consideration whether they are qualified enough, while Bengali experts are often exploited on very low salaries. Complaints also are not rare about the harsh treatment which Bengali employees receive from their employers in such establishments. On the whole we feel that there is indeed a large room for improvement in the attitude of non-Bengali industrial and commercial firms in this province towards Bengali institutions of technical education and the students they turn out.

103. **The present position.**—At the present moment also almost the same state of things is continuing although there are signs of an enlightened outlook on the part of some employers. The experience of the Calcutta Technical School in the matter of enlisting support from trade and industry has been anything but happy; as the Principal maintains, but for his personal influence and enterprise the school would have ceased to exist by now. The remarks of the Principal of Bengal Engineering College, Sibpur, also in this connexion are interesting and suggestive. He states—

“Indian students in Engineering receive a theoretical training of sufficiently high standard. Unfortunately, however, they do not get opportunities for such responsible work as would enable them to attain the status of expert foreign engineers. The Railways, the Port Trusts and prominent firms like the Tatas have many distinguished Indian engineers in their employ, but whenever any major construction involving new designs is contemplated by them, they invariably requisition the services of foreign experts. It is really deplorable that this preference for foreign engineering experts is as strong among Indian firms as among their foreign confreres. The result of such a state of things is that Indian engineers do rarely find it possible to show their merits even when the facilities for practical training are made available to them.

“The available facilities for apprenticeship training are very inadequate. If opportunities are given, Indian students can acquit themselves very creditably.

“The inadequacy of the facilities for apprenticeship training is felt even in respect of the 50 students (about 35 civil, 7 or 8 Mechanical and 7 or 8 Electrical) that come out of the Bengal Engineering College from year to year. Even the Port Trusts and the Improvement Trust do not always give preference to the ex-students, of this college. The responsibility for arranging the apprenticeship training by negotiating with firms devolves on the Principal. So far he has managed it with some difficulty but if the war is on, it may become impossible for him to secure such facilities for all the boys.”

There is thus a clear case for establishing a satisfactory link between the institutions imparting technical education and the industry and trade. How this link may be evolved through appropriate organizations will be discussed later.

**104. Various methods of co-operation between business and education.**— Since in this country the trade and industry do not consider technical education as a joint concern for their long-run interest, co-operation between education and business has not, as indicated above, been either adequate or in a large scale. There are, of course, various trade associations, chambers of commerce and industrial associations but unlike any other advanced countries of the west, they do not recognise the necessity for assisting and stimulating technical education in order that efficient and adequate recruits may be available for them. This state of affairs is not entirely due to the inadequate development of industries and trade in this country but it is mainly due to the non-appreciation of the community of interest that exists between industry and education. In most of the advanced countries of the West it is found that large scale industries and trades are always willing and ready to encourage technical education for they are conscious of the need for raising the standard of efficiency in their employees. If they spend sums for promoting technical education, its ultimate and long run effect is to facilitate the creation of an army of efficient recruits for the various vocations and trades. In England, for instance, the Board of Education co-operates through the services of its inspectors with such national bodies as the Federation of Boot and Shoes Manufacturers, the Institutions of Mechanical Engineers and the City and Guilds of London Institute in the drafting and continuous revision of schemes of instruction in the many subjects included in the vocational education as a whole. Apart from such assistance there are other methods of co-operation between business and education prevalent in some of the Western countries which may be summarised as follows:—

(a) Financial assistance—It is often the experience of technical institutions to run short of equipment and funds. In such cases business or industrial firms often come forward with generous offers of equipment of raw materials or machinery, etc. In England, France and Holland such cases of help are not rare. In India also such assistance is sometimes received though not to the same extent as institutions of general education receive.

(b) Assistance in the form of receiving apprentices providing accommodation and the services of competent teachers. These forms of help are often received in many countries. The Mukherjee Committee which was appointed in Bengal in 1919 to advise on the question of co-ordinating the scheme of Apprenticeship Training in the E. B. Railway Workshops at Kanchrapara with the mechanical engineering classes of the Sibpur College made useful suggestions in this respect.

(c) Large employers often make generous donations for the construction of premises of technical institutions. Good examples of such assistance are furnished by the Technical Schools at Chesterfield and Middleborough in

England which were constructed by individual families at a cost of more than £100,000. The important technical schools at Huddersfield and Manchester were also recipient of such donations

(d) In some countries a special tax is also raised in order to promote vocational education. In France, for instance, every employer who pays more than 10,000 francs (about Rs. 1,300) a year in wages is bound by law either to pay a special tax of 2 francs for every thousand francs of the wages he pays, or to show that he is entitled to exemption from the whole or part of this tax because he is already contributing in some other approved ways to the proper education of the young persons in his employ. One firm which was exempted altogether from the payment of the tax satisfied the authorities that it was already spending on the training of its apprentices four times the sum which would otherwise have been due from it. The total yield of the tax in a recent year after all the proper exemptions had been made, was 160 million francs (about three crores of rupees) and this was devoted to the promotion of technical education and related purposes.

105 **Suggestion by Mr. Abbott.**—There is another suggestion made by Mr Abbott for ensuring maximum co-operation between technical institutions and the industry and trade of the country. He suggests that in every province there should be established an "Advisory Committee for Vocational Education" which should be properly representative both of industry and commerce and of education. In each province it would necessarily include the Director of Public Instruction, the Director of Industries, two or three principals of the important vocational schools, and four or five businessmen selected and appointed by the Provincial Government itself, not as representing interests, but on account of their knowledge and experience of particular branches of industry and commerce and their willingness to contribute to the solution of the problems of technical education.

## CHAPTER VI.

### A Curriculum of Studies for Technical and Industrial Education in Bengal.

106. **Some general considerations.**—In the last Chapter, we emphasised in some details the vital importance of technical education in national life. In this we propose to deal with the problem of how best to impart this education so that the maximum benefits of a well-organized system of technical education may be achieved. We have indicated the relationship between general education and technical education and also its relationship with industry. So the important question of a suitable curriculum of studies remains to be considered. Since curriculum is nothing but a technique of imparting education, in accordance with certain recognized principles suited to the psychology of young minds, the contents of curriculum should so carefully be planned that it may effectively serve as a means of bringing to bear upon the young minds, such formative influences as are considered to be of high importance either for their own development or for the continued well-being of the community. Thus in formulating the curriculum of technical education for any stage or for any type of schools that may be decided upon, the paramount consideration should be to initiate students into the great traditions of culture and knowledge that this country and other advanced countries possess. While doing so, the curriculum of studies should seek to provide for the growth of each pupil's power of body, will, emotion, intellect and conscience. Having these considerations in view, the governing principles of a curriculum were recommended by the Consultative Committee on Secondary Education in England (generally known as Spens Report) as follows:—

• "We adopt as a governing principle that the course of instruction for pupils between the ages of 11 and 16 should fulfil the following conditions:—

- (i) It should cater for the special needs of adolescence; that is to say: it should be related to the natural activities of body and mind during that period and both illuminate and guide the pupil's experience;

- (ii) It should develop and harmonise the powers of body, will, intellect, emotion and conscience;
- (iii) It should not consist to any considerable extent in courses which are only of value, if the subjects are carried further;
- (iv) It should be reasonably "all-round", while giving full opportunity for the pursuit of individual interests; and
- (v) It should stimulate or create the desire to continue some form of study whether or not pupils leave school at 16:

Provided these conditions are satisfied, we desire to leave as much freedom as possible to schools in the selection of studies and in their content, and in the methods of teaching, which in their several circumstances seem best fitted to produce a generation of young men and women sensitive to moral values and trained to concentrate their attention, to think consecutively and readily, to express ideas exactly and coherently, and to exercise due caution in accepting evidence and drawing conclusion."

We feel that we may recommend the same principles to be kept in view in shaping the curriculum of studies from the stage of 11 onward when boys generally have their first year in High Schools.

107. **The Scheme.**—The Scheme of technical education which we envisage in Bengal will comprise the following stages:—

*Stage I.*—This will comprise two years, viz., 11+ to 13 which correspond to classes VII and VIII of general High Schools. The course of studies during this stage will be common in the Technical High Schools and the General High Schools. This stage is to be the basis of higher technical education or higher general education according as students of varying aptitudes show definite leanings. At the conclusion of this stage boys should be in a position to make a definite decision either for higher general education or for a technical line. The contents of curriculum at this stage should cover the following:—

- (I) Language, Literature, History and Geography.
- (II) Mathematics, Mensuration, elementary science and drawing
- (III) Free hand perspective and elementary engineering drawing.
- (IV) Some workshop practices.
- (V) Physical Education.

The importance of literature, history and geography in any syllabus of studies is unquestioned, for it is by introducing the adolescent minds to the beauties of noble ideas as contained in national literature, the brave deeds recorded in history and the wonders of the physical world that their ideas and imagination can be stimulated. In any studies such stimulation of imagination is of the highest importance. The need for mathematics inclusive of drawing and some elementary science as parts of the curriculum cannot also be over-emphasised, for science is bound to create a growing curiosity in the minds of the adolescent boys and girls which will lead to the expansion of intellect. Then in order to give a technical bias to the studies, the inclusion of some workshop practices such as drilling, moulding, etc., seems to be very desirable. Physical education again is nowadays looked upon, as a national necessity and we emphasise the need for its inclusion in any curriculum of studies. This common course between general High English Schools and Technical High Schools will enable those boys who are not suited for technical careers by reason of special aptitudes or any other considerations, to proceed to the general High Schools and *vice versa*.

*Stage II.*—This stage will comprise classes IX and X and correspond to ages 14 and 15. Technical courses during this stage will include practical training in the school workshops. The course of studies for this stage will correspond to the Matriculation Standard of Indian Universities.

*Stage III.*—This stage will comprise classes XI and XII corresponding to the Intermediate course under the existing system of general education. The course of technical studies for this stage will be of a more specialized and higher type as indicated hereafter.

*Stage IV.*—This stage will comprise the graduate and post-graduate training and researches in technical subjects as well as the courses of training in the Senior Technical Institutes like Kanchrapara Railway Technical School. A fuller explanation of the courses is furnished in Chapters VIII and X.

The outlines are suggested to indicate a general plan of technical education which we envisage and which should be planned by appropriate adjustment in the existing system of education in both the technical side and the general side, and by the creation of such new institutions as may be considered necessary. The outlines as suggested correspond, more or less to the stages in the prevailing system of general education; in a sense this is inevitable if we are to maintain a logical parity between the two systems of education. But we prefer to recommend a more comprehensive second stage comprising a course of three years corresponding to classes IX, X and XI, obviating the necessity of intermediate classes, but this reform may be kept pending till necessary reforms in the general education system are carried out (vide paragraph 91 in Chapter IV).

108. **The question of parity with general education.**—As we have already emphasised, there is a distinct need for establishing necessary parity between technical education and general education, for the exclusive importance hitherto attached to general education has been responsible for considerable wastage of young talents. We have found that simply because technical education was all along regarded as an inferior type of education, it failed to attract the best brains and many lines of trade and industry which might have been usefully developed, remained neglected to the net economic loss of the society. We should, therefore, try to devise such a system of technical education in Bengal as would serve the progressive requirements of the people in the existing conditions. With this end in view we envisage two types of technical schools, viz, (i) Junior Technical Schools corresponding to General High Schools which may be named Technical High Schools, and (ii) Technical Intermediate Colleges corresponding to the Intermediate courses of the University. Technical High School will cover stage I and stage II, while the Technical Intermediate College will cover stage III in addition to the first two stages.

109 **Trade classes to be attached to stages II and III.**—In view of the manifold practical utility of trade classes to young boys under technical training, we consider it necessary to recommend that appropriate trade classes in such handicrafts as have natural environmental advantages in certain areas should be attached to the technical institution situated in those areas. For instance, trade classes in brass and bell metal work may be suitably introduced in Murshidabad areas or trade classes in the manufacture of mango chutneys may be introduced in Malda areas. Similarly if a technical school is established in Dacca, training classes in the manufacture of conch-shell articles and button making may be appropriately attached to it. The special utility of introducing such trade classes in the natural zones would be that it will be easy to draw willing students from the respective trades and also that raw materials for such trades will be locally available. The trade classes to be attached to those institutions which comprise only stages I and II are to impart training in the art of making some such articles as mentioned above, as also in elementary principles of business methods, while the trade classes to be attached to Technical Intermediate Colleges should impart more complex training in such and other handicraft combining commercial and business methods. The main purpose behind the organization of such trade classes is to enable the students to learn some practical trades so that even if they do not succeed in going up for higher technical education,

they may settle down and pursue any or some of these useful trades as independent business men. The senior trade classes are intended to be of more practical value to the students, for these will teach business methods such as grading of goods, cost accounting, salesmanships, etc., by actual demonstration of production and disposal through Demonstration Factories specially organized under the auspices of the Technical Schools concerned. Two explanatory notes on the scope and utility of demonstration or model factories and Trade Classes respectively are appended to this Chapter (*vide* Note I and Note II).

110. **Openings for students at the end of different stages.**—The syllabus of students for each stage as should be so planned that from each stage students may go forward to a useful line of studies or a professional line. Thus boys having passed stage II will have before them the following openings:—(i) admission into general intermediate course; (ii) admission into stage III, i.e., Technical Intermediate Course; (iii) Senior Trade Classes; and (iv) entry into business firms as semi-skilled apprentices. After stage III the following openings will be available:—(i) admission into University classes; (ii) admission into Technical institutions of University Standard, e.g., Sibpur Engineering College, etc., (iii) admission into some of the Technological Departments of the University; (iv) Specialized technical institutions, e.g., the Kanchrapara Railway Technical School (*vide* Chapter VIII), the Central Technological Institute (*vide* Chapter XIV), etc., and (v) admission into business firms as apprentices for supervisory posts. Since the industrialization of the country is proceeding apace and new openings are being created for the employment of trained personnel, it may be confidently anticipated that the trainees coming out of all these stages of technical and industrial education will find quite remunerative berths in those spheres for which they are technically equipped.

#### NOTE I.

##### Model Factories.

Since in the body of our Report many references have been made to the need for Demonstration Factories to be attached to Technical High Schools, District Weaving Schools, and Trade Classes, a fuller explanation of the real scope and scale of such factories is probably called for. The *raison d'être* of a demonstration factory is that in order to render theoretical training in industries or trades practical and fruitful in actual practice, every system of training should involve practical knowledge and training in industrial processes under commercial conditions organized for the purpose. In the case of institutions which maintain a close contact with industries and can send their boys for practical training in these industries, demonstration factories are not evidently called for. In the case of the Calcutta Technical School or the Kanchrapara Railway Technical School for instances, demonstration factories are not necessary. In the first case, the School receives its students from among the employees or apprentices from various industries, where they undergo practical training under factory conditions, while in the latter case, the Railway Workshops serve the purpose well. A demonstration factory is intended:—

- (i) to demonstrate the actual industrial processes under commercial conditions, so that the trainees may acquire practical knowledge about industrial and trade operations which will enable them to become independent business men; and
- (ii) to teach commercial methods such as costing, salesmanship, marketing, etc., all of which are essential for becoming practical businessmen.

It will thus be evident that the school workshop can hardly be a substitute for a demonstration factory since in the case of the former commercial conditions do not exist and the trainees cannot obtain the necessary practical knowledge and experience.



### **Every trade or industry may not require or justify a Model Factory.**

While demonstration factories have their own importance, it does not follow that every trade class or industrial institution should call for a demonstration factory. Considerations of utility will in every case determine the choice. Practical difficulties may some times forbid the setting up of demonstration factories. For an electrician's course, for instance, a demonstration factory of electrical goods is not a feasible proposition. In a small scale such factories cannot be economically set up. For motor mechanics course again an automobile factory may not be a possibility or a necessity at all. On the other hand a Wood Working Institute or a weaving school must afford a demonstration factory, if the training courses it offers, are intended to produce independent businessmen.

### **Should Model Factories be run on a profit earning commercial basis?**

An educational institute with its workshop may on account of its educative value be run irrespective of whether it can pay its ways or its running involves a net annual loss. For educational institutes such costing is not usually considered necessary or desirable. But a demonstration factory although having an educative value cannot claim such a special consideration. Since it is a factory intended to teach the trainees commercial methods its functioning should be such as to impart a sound training in business methods. If the factory is run on uneconomic lines and proves a losing concern certainly the trainees will receive a faulty training at any rate. At the same time, profit earning should not be the principal objective of the demonstration factory, for, over-emphasis on profits may lead to the sacrifice of the training aspect. A profit earning capacity of the demonstration factory is very desirable and should be always aimed at, but if at the initial stage or in some years it cannot pay its way or earn a profit, this alone should not constitute an argument for abolishing the factory. It is expected that since the new students will be like apprentices under skilled personnel employed under the factory, every demonstration factory, if run on sound lines, will yield profits.

### **The Factory Management.**

The above considerations should suggest that the factory management should consist of such staff as are equipped with consummate business experience and technical knowledge. This is an essential necessity, for the quality of training imparted by this demonstration factory will obviously depend on the quality of personnel constituting its management

### **NOTE II.**

#### **Organization of Trade Schools or Classes.**

A general statement has been furnished in Chapter VI regarding the place and role of trade classes or trade schools in the scheme of technical education as suggested by us. In every advanced country trade schools by reason of their usefulness as the media of practical instruction in specific trades form a necessary part of the technical system. In England, for instance, trade schools enjoy the status and utility of Junior Technical Schools. The Schools recognized by the Board of Education under the name "Junior Technical School" fall under the following four classes—

(1) Those preparing boys to enter certain specific industries or groups of industries without restriction to particular occupations within such industries.

Most of these schools prepare their pupils for the engineering or the building industries, but some of them prepare for the chemical or the mining industries or for the mercantile marine and the fishing industry.

The schools in this class are popularly known as Junior Technical Schools.

(ii) Schools preparing boys and girls to enter specific occupations, such as furniture and cabinet-making, tailoring, printing, silver-smiths' work, musical instrument making, women's needle trades, hairdressing, etc.

As might be surmised from the character of the occupations into which their pupils enter, these schools differ from those classified under (i) above in that the proportion of school time devoted to craft work is greater and frequently amounts to 50 per cent or more of the total time. These schools, however, pay adequate attention to the other subjects of the curriculum. Practically all these schools are situated in London, where they are now known as "Junior Technical Schools" though they are still often popularly described as "Trade Schools".

(iii) Schools intended to prepare girls for home management. These schools have more in common with the schools classified under (i) above than with those under (ii) because they aim at giving a general preparation for home management rather than a special preparation for any particular department of it. They devote a considerable proportion of school time to domestic crafts and are known as "Junior House-wifery Schools".

(iv) Schools preparing boys and girls for entry into commercial life, as book-keepers, cashiers, general clerks, telephone operators, shorthand-typists, etc. These schools are generally known as "Junior Commercial Schools". In addition there are the Junior Art Departments in Schools of Art, and the Schools of Nautical Training.

Although here in Bengal, we are not visualizing a replica of this system, it will be evident from what we stated in Chapter VI that our system resembles the English system in many details. In so far as the role of "Trade Schools" is concerned, the English types answer to our projected models quite fittingly.

#### **Trade classes as alternative to apprenticeship courses.**

As already indicated, students after having passed stage II may enter business firms as semi-skilled apprentices. We have dealt with the question of apprenticeship training in Chapter XVIII. Now as an alternative to the apprenticeship course, students who are already in the trades and industries, or are about to enter them, will be able to take short evening or day industrial or Trade Courses to be provided in the various grades of Technical institutions.

Classes for specialized instruction in single subjects appertaining to industries or trades in the locality may be easily arranged in Technical Institutions. Teachers for such classes will be drawn from the industry and courses of training should be settled in consultation with employers so that these may be useful to the employees with different standards of attainments. Those already in the industry will be trained to the advantage of both the employers and employees in these evening or day classes. Others, with the grounding of technical education in the schools in the locality and brought up in the special influence and atmosphere of the industry can take up these evening classes in preparation for entering the industry. The younger folks of the industrial workers will also find good scope to be trained as artisans in the workshops in these schools. Thus a Junior Technical School south of Howrah would have evening classes dealing with jute, while north of Calcutta, evening class with paper making as a subject, will be useful. For more central places, where several industries exist, similar arrangements could be made in the Senior Technical Schools for several industries. Thus the Calcutta Technical School may serve the additional purpose of a trade school, besides giving general technical education. Further courses of a higher standard including research than is possible in a mofussil school, could be started at important centres, extending the affiliation to the evening courses in mofussil schools, as is the system followed in Scotland. Thus

Serampore may be the central school for all mofussil day as well as evening schools on textile subjects, jute, cotton, silk, etc. In Calcutta, the printing trade, plumbing trade, electric wiring trade, Pharmaceutical Chemistry, photography, lithography, glass making, leather article making, tailoring, upholstery and a host of other trade classes may find scope for training their employees in the theory of their work in evening training classes. The Heads of the Institutions would sound particular industries and explore the possibility of starting the classes. For each institution, there will be an advisory body for each particular industry composed of members of the industry or trade in the subject. They will choose the recruits, prepare them according to their requirements and certify as to the competence of the pupils after the courses. The courses of studies at these schools, their financial aid, and working methods will be determined and supervised by the Board of Technical and Industrial Education as proposed by us. The problem of the employment of the trainees of these trade schools will also be looked after by the Employment Bureau attached to the Board (vide Chapter XIX).

### The Trade Classes at Jadavpur Engineering College.

A different category of trade classes is suggested for the Jadavpur Engineering College which had an independent growth on its own lines and its present line of work is not proposed to be disturbed, although it will be welcome to join the scheme in stage II. It is the earnest desire of every one interested in the welfare of the Province that new industries should be started or at least attempted, while old ones are being strengthened, as envisaged above. Jadavpur with its spacious grounds will provide scope for the attempt to start new industries in demonstration factories on an experimental basis. Expert services will be requisitioned and the practical work will be carried on in necessary sheds properly equipped. All statistics should be kept on individual lines of work to form a basis for private enterprise to take over as a commercial proposition. While new subjects will be introduced, the work on the old lines will be carried on even after the disposal of the concerns, if considered desirable. The pupils will attend evening or day trade classes at the institute for the theoretical grounding on the subject of their work. A degree of responsibility will be attached to the expert and the Principal of the Institute to bring such attempts to a successful issue, always avoiding haphazard schemes. It will, therefore, devolve on the Principal to explore the possibility of starting a new industry, satisfy himself as to the capacity of the expert and take the initiative.

### Trade Schools in Different Districts.

It is not possible to make concrete suggestions as to the centres where trade schools are to be started in respect of various trades. A list of the important cottage industries along with their centres is furnished as follows which will provide indications as to the suitability of starting such schools in various lines:—

District. 1	Important Cottage Industries 2	Important Centres. 3
Burdwan	Cutlery	Kanchannagar.
Birbhum	(*) Silk Weaving	Bishnupur.
	(**) Tussar Weaving	Karidda, Kalpur.
	(***) Lac and Lac toys	Ilambazar.
Bankura	(*) Handloom Weaving	Patrasayer Patrasayer, Vishnupur, Sonamukhi.
	(**) Brass and Bell metal	Patrasayer, Bishnupur.
Midnapore	(*) Handloom weaving	Anandpur.
	(**) Mat making	Mirgoda, Dubda, Negui
Hooghly	(*) Cotton Weaving	Rajbalthat, Serampur, Dhanakhah, Begampur.
	(**) Hand-made paper	Shahabazar, Kalsa.
	(***) Embroidery	Bagnan.

District. 1	Important Cottage Industries. 2	Important Centres. 3
Howrah	(i) Cotton Weaving	Domjur
24-Parganas	(ii) Lock and Key	Domjur, Hantal
Calcutta	(i) Tanning	Shahapur, Durgapur, Tangar.
	(ii) Lock and Key	Natarorc.
	(i) Hosiery	Calcutta (Kalghat), Belaghata.
	(ii) Tanneries	Tiljala and Manicktala.
	(iii) Umbrella	Nebutala, Burabazar.
	(iv) Soap	Narikeldanga, Bagmari.
Nadia	(v) Hat	Belaghata.
	(i) Hat	Kaliganj
	(ii) Brass and Bell metal	Nabadwip and Katiat
	(iii) Cotton Weaving	Santipur and Chuadanga, Kumar- khal
	(iv) Pottery	Krishnagar.
Murshidabad	(i) Silk	Berhampore, Islampur
	(ii) Brass and Bell metal	Khagra
Jessore	(i) Combs, buttons	Changacha, Jessore.
Khulna	(i) Cotton Weaving	Bagerhat
	(ii) Mat	
Dacca	(i) Cotton Weaving	Baburhat, Siddhiganj.
	(ii) Brass and Bell metal	Lohajang, Dhamrai.
	(iii) Soap	Imanganj, Narinda
	(iv) Conch-shell	Shakaribazar.
	(v) Button	Nangalbund, Anuligola
	(vi) Hand-made paper	Arial
	(vii) Hosiery	Narayanganj
	(viii) Boat-building	Lohajang, Narayanganj Tal- tulla
	(ix) Pottery	Srinagar, Dighali
Mymensingh	(i) Cotton Weaving	Tangail, Bajitpur
Faridpur	(i) Gur	Goalundo, Rajbari.
Barisal	(i) Boat-making	Jhalakati
Chittagong	(ii) Cutlery or blacksmithy	Uzirpur, Barapaika
	(i) Cotton Weaving	Chakharra, Ramu, Chandrakona.
	(ii) Cotton Ginning	Fatiyabad, Katakhal.
	(iii) Boat-building	Gadu, Balam
	(iv) Hand-made paper	Rastivu, Kagachipara
Tippera	(i) Cotton Weaving	Mainamati
	(ii) Brass and Button	Ramchandrapur
	(iii) Umbrella	Brahmanbaria.
	(iv) Hooka	Comilla
Noakhali	(i) Cotton Weaving	howmohani, Feni
	(ii) Oil-pressing	Sandwip
Rajshahi	(i) Brass and Bell metal	Kani halt
	(ii) Matka Weaving	Chandan Sahan, Rajarhati
	(iii) Blanket	Veri ara
Dinajpur	(i) Sugar and Gur	Kaharol, Fulbari
Jalpaiguri	(i) Cotton Weaving	Paharpur.
Rangpur	(i) Cotton Weaving	Kurigram.
Bogra	(i) Silk Weaving	Malatinagar.
Pabna	(i) Cotton Weaving	Sahazadpur
	(ii) Hosiery	Pabna
	(iii) Rope	Bera.
Malda	(i) Brass and Bell metal	Englishbazar, Kahgram, Nawabganj.
	(ii) Silk Weaving	Sibganj
	(iii) Cotton Weaving	Kabachak, Kharba
Darjeeling	(i) Blanket	Kalimpong.

Some of the most important considerations in this connection will no doubt be the existence of local trades and environmental advantages with regard to the supply of raw materials, availability of willing students and a steady, local demand for specific products.

### Trade Schools involve the Organization of Demonstration Factories.

The very nature and role of Trade Schools should suggest that in order to make the training really useful to the trainees and enable them to set up

business independently, demonstration factories wherever feasible and desirable, should be organized. Training in business methods to be imparted through these demonstration factories cannot but be of great practical value to the after careers of the trainees.

### Economic Potentiality of Trade Schools.

From the above considerations it will be evident that trade schools have a very useful role to play in any scheme of industrial education. If we want to develop local small scale industries, to exploit their commercial possibilities, to enable youngmen to perform a necessary role in such development and thus to create employment for them, we cannot think of better organizations for the purpose. Trade classes have, therefore, an essentially useful role to perform in the industrial development of the Province. In fact they assist the process of wealth creation in the country, by stimulating local industries. This point may be illustrated by a few examples. In normal times (pre-war) Bengal used to import annually the following articles from abroad:—

Imports into Bengal	Rs	Corresponding industries prevalent in Bengal.	Rs.
		(Estimated annual production)	
Glass wares ..	50,00,000	1 Glass Industry ..	25,00,000
Cutlery goods ..	11,00,000	2 Cutlery Industry ..	3,00,000
Cotton fabrics ..	15 crores	3 Handloom Cotton Weaving ..	5 crores
Button of all kinds ..	8,00,000	4 Button Industry ..	2,50,000
Soap ..	8,00,000	5. Soap Industry ..	75,00,000
Silk fabrics ..	12,73,800	6 Handloom Silk Weaving ..	25,00,000
Umbrella fittings, etc. .	8,28,000	7 Umbrella Industry ..	2,50,000
Horn articles ..	50,000	8. Horn Industry ..	1,00,000

From the position of these few industries, it will be easy to conclude that they are creating national wealth and have replaced imports to the extent of their production. The import figures as shown above indicate also the extent to which the existing small industries of Bengal may yet develop. There are many other articles which are imported into Bengal from outside and for the manufacture of which industries exist or may be organized in the Province. The outflow of national wealth to the extent of such imports may be prevented, if the necessary technical personnel are available for developing the requisite industries. We feel that the task of producing the necessary technical personnel may be accomplished if the facilities of technical education which are proposing are organized in an adequate scale. We are, therefore, laying emphasis on the point that every possible effort ought to be made to develop indigenous industries so that wealth and employment may be created to enrich the province which is our own.

## CHAPTER VII.

### Junior Technical Schools.

111. We have already indicated in Chapter III, that there are functioning in Bengal four Junior Technical Schools under the direct control and supervision of the Department of Industries and about a hundred aided schools distributed in different districts of which about 10 only may be considered important. We are now to examine how far their present organisation and courses of training serve the needs of technical education and how these can be fitted into our general scheme of technical and industrial education as proposed in the previous chapter.

112. **Courses of training offered by the Schools.**—Originally these schools were run by the District Boards in a dozen important districts. All of them conducted artisan classes for giving training in carpentry, blacksmithy, tinsmithy, etc., while four of them at Rangpur, Pabna,

Rajshahi and Burdwan also conducted classes for the training of Sub-overseers. In 1912, the 4 schools at Pabna, Bogra, Barisal and Rangpur were provincialized and placed under the Department of Education. In 1922, again the control of these 4 schools was transferred from that Department to the Department of Industries. At the present moment the different schools offer the following courses in addition to Junior Technical courses:—

	Courses.	Duration. Years.
Government Technical Schools—		
1. Barisal	(a) Artisan classes	3
2. Pabna	(a) Artisan classes	3
	(b) Amin classes	1
	(c) Sub-overseer classes	2
	(d) Motor Mechanic classes	1
3. Rangpur	(a) Artisan classes	3
	(b) Motor Mechanic classes	1
4. Bogra	(a) Artisan classes	3
	(b) Motor Mechanic classes	1
Aided Technical Schools—		
Rajshahi		
	(a) Artisan classes	3
	(b) Amin classes	1
	(c) Sub-overseer classes	1
Burdwan	(a) Artisan classes	3
	(b) Sub-overseer classes	2
Faridpur	(a) Special Technical classes in carpentry	
	(b) Artisan classes	3
Krishnagar	(a) Artisan classes	3
Hooghly	(a) Artisan classes	3
Vishnupur	(a) Artisan classes	3
Mymensingh	(a) Artisan classes	3
Comilla	(a) Artisan classes	3
Khulna	(a) Artisan classes	3

A review of these courses of studies reveals a picture of a system of education which lacks a central purpose and co-ordination. Although certain schools have introduced improved technical courses, the standard of training imparted by many of these schools remains low. In a bulletin published by the Department of Industries, the curriculum of these schools was sought to be discussed. The relevant portion in this bulletin has been quoted in paragraph 71 above.

113. **Drawbacks of the present system.**—The explanation offered in the bulletin was more a plea for certain reforms than a statement of the existing organization and in fact the reforms envisaged in the Departmental bulletin were not carried out. We have considered the working results of most of these institutions and besides we have before us a mass of materials arising out of discussions which the Chairman of the Committee had with the heads of these institutions as well as with District authorities. On the basis of all these the present organizations reveal a number of serious defects which would indicate how far the existing system is capable of meeting the progressive needs of technical education in the province. We sum up the defects as follows:—

(a) The schools were originally expected to function as Industrial Schools, but whatever industrial training they impart is neither adequate nor efficient. In the curricula of these schools, specially those under the direct control of the Department, the Amin and Sub-overseer courses are given a position of importance which is incompatible with their professed objectives. The result has been that technical courses which are taught there, have in many cases been reduced to the position of secondary importance in the scheme of training provided for.

(b) One of the important objectives of these schools, viz., to train the cottage workers in useful industrial lines has not been fulfilled, for they have failed to attract cottage workers, either by reason of their faulty organization or on account of lack of necessary facilities for the purpose.

(c) Another objective, viz., to impart a thorough training to the middle-class young men so as to enable them to start independent business has not also been achieved to any appreciable extent. This is mainly due to the absence of a fixed admission standard, adequate equipments, qualified teacher, want of training in efficient business methods and faulty organization.

(d) The schools are generally located far away from industrial centres and for their lack of initiative, are not in a position to supply trained hands to particular industries according to their requirements. And for the same reason, they could not stimulate industrial progress in their respective localities

(e) As regards equipments, most of the schools are inadequately equipped. Our queries on this point have invariably evoked from the heads of all Technical Schools either Government controlled or aided, spontaneous suggestions for more qualified teachers, new equipments and expansions which are in their opinions very essential in the interest of efficient technical training. The workshop attached to the schools is, with a few honourable exceptions, a mere apology for what is required in order to give to the students a practical and useful training.

**114 Suggestions by the Director of Industries.**—The above drawbacks are partly the result of the inherent defects of the scheme under which the institutions are functioning and are partly due to the failure of the institution to adjust themselves to their respective environments. Referring to these questions, the Director of Industries expressed the following viewpoints in his brochure "A Five-Year Plan for Industrial Development in Bengal" (1937):—

"I would not like to impose a thorough change upon the aided institutions but I am definitely in favour of changing the complex of our Government institutions at Bogra, Rangpur, Pabna, and Barisal and of some of the aided schools. While the existing course of studies followed in these schools under the fostering care of this Department may be allowed to continue in a modified manner, I would like to make special arrangements for imparting the theoretical and practical training in those selected types of small and cottage industries for which there are scope and prospects in the 'Zone', in which these institutions are situated. It may be necessary to expand the scope of some of them and even to establish new schools in other centres and it is hoped that the Department will endeavour to meet new developments as far as it may lie in its power and resources. To take an instance, there is a growing hosiery industry in Pabna and it is but in the fitness of things that the Pabna Technical School should have attached to it a well equipped section to impart training in all branches of hosiery manufacture so that while, on the one hand, students trained in this school may find employment in the existing factories at Pabna, Calcutta and other places of Bengal or may start new ones and the industry, on the other hand, may profit by getting a supply of trained labour. Similarly arrangements may be made for the training in jute weaving in the Bogra School, in the manufacture of Jute bags, satranchis, etc., wood works and tobacco curing, etc., in Rangpur and Coir weaving, etc., in Barisal. The broad principle that should be followed is that our system of technical education must be able to keep pace with the growing needs of our industries or adjust itself to the changes in circumstances. Otherwise, our technical institutions will hardly justify their existence"

\* **115. Reforms called for.**—The above observations of the Director of Industries, evidently urge the need for reforms in the curricula and organisation of the Schools, in certain directions. As we shall presently explain, the point raised is covered by the reforms envisaged in the proposed scheme of technical and industrial education for Bengal. For instance, the suggestion by the Director of Industries, for training in

industries which have local environmental advantages will be suitably met by the Trade classes or schools which will be attached to the Technical High Schools and the Technical Intermediate Colleges (*vide* Chapter. VI). This is, however, only one item of reform called for in order to adjust the existing institutions in the scheme proposed by us. Other reforms that will be needed for the purpose may be summed up as follows:—

(a) There should be a unified control of the Institutions in respect of their curricula and the examination of their pupils. At the present moment the examinations in the Government Technical Schools is conducted by Examiners chosen by the Managing Committee, certificate signed by the District Magistrate being issued to successful candidates. The curriculum of the aided schools is settled by the District Board with the approval of the Industries Department. Examination in these schools are conducted by the District Boards and certificates issued to successful candidates are signed by the Chairman. This system is admittedly lacking in co-ordination with the result that the training imparted does not enjoy necessary prestige nor can it be said that the system ensures satisfactory efficiency. Under the scheme proposed by us, this absence of a proper regulating and co-ordinating authority will be removed by the functioning of the Board envisaged

(b) The curricula of studies at the Junior Technical Schools to be named Technical High Schools under the proposed scheme will comprise stages I & II, under the general scheme of technical education and will have to be remodelled. It is not, however, suggested that existing courses of training such as Survey, Amin Class, Sub-Overseering, etc., will have to be dropped. It is our objective that while these courses will be retained in the Schools where they exist now, they will also be strengthened by organizational improvement. These subjects will thus form part of the curricula for the specific Technical High Schools.

(c) The establishment of Trade Classes or Trade Schools, as mentioned above, will be a necessary accompaniment of every Technical High School and will be governed by such conditions and considerations as explained in Chapter VI.

116. **Two issues to be considered.**—In view of the above reforms needed to bring the existing Junior Technical Schools into line with the general scheme, two issues require to be settled, viz.:—

- (a) Whether all the Junior Technical Schools should or can be converted into Technical High Schools, and
- (b) Whether Artisan Classes should remain a part and parcel of such Technical High Schools or should be kept apart as Artisan Schools with such modifications in their curricula and organization as may be called for.

With regard to the first issue, we recognise that it may not be possible to convert all the Junior Technical Schools into full-fledged Technical High Schools for reasons of high costs involved and of practicability. We admit that the process is bound to be gradual. Since the Provincial Board of Technical and Industrial Education is proposed to be brought into being at an early date to implement the suggestions contained in this Report, we suggest that the Board may in good time, take up the question of selecting the best few schools among the existing Junior Technical Schools with a view to convert them into Technical High Schools. A few general High Schools also may be selected for converting them into Technical High Schools as the Bombay Government had done in the case of (i) Sholapur H. E. School, and (ii) Elphinstone H. E. School. It may be mentioned that the Delhi Polytechnic also has recently transformed the Government High English School into a Technical High School. As possible suggestions, we may mention that for this purpose



of conversion, the cases of Dacca Collegiate School, the Hare School in Calcutta and two or three other Government High Schools may be considered.

117. **The Artisan Schools.**—There are two viewpoints on the issue whether they should be independent schools or form part of the Technical High Schools. While it is urged that the artisan courses are liable to be neglected in the company of a bigger institution, the other viewpoint emphasises that the artisan courses are sure to be more useful in the company of the Technical High School where the atmosphere will serve as a stimulating factor. There are arguments on each side no doubt, but we feel that the question may be solved purely on the basis of local convenience and administrative economy. Previous arrangements also should play an important part in decisions either way. This matter may, however, be fully gone into by the Board of Technical Education when it comes into existence.

118. **The Industrial Schools.**—While discussing the future re-organization of the Junior Technical Schools, our attention is naturally claimed by the various Industrial Schools, numbering about 90, which do not come under the category of Junior Technical Schools. Industrial Classes, like those of Ananda Asram at Dacca, Banī Bhaban or Saroj Nalini Industrial School at Calcutta and host of other schools, as well as the industrial classes of a few of the general line schools (H. E. or M. E.), and charitable institutions such as the Blind, Deaf and Dumb Schools, etc., come under this head. These neither strengthen any organized industrial work as already discussed nor generally attempt to open up new industrial lines. Yet they seek to train pupils so that they may find employment directly by following some forms of home industries, of which there are many examples in the province and some of which are dying out. They also sometimes aim at improving some particular local home industry (for example, weaving) by the introduction of new appliances and methods of work, and help unemployed talented pupils to take up particular industries without reference to the traditional restrictions of hereditary pursuits. Some, in connection with general schools, serve the purpose of manual training and inculcation of a bias towards manual work. The object is laudable and the economic value of a larger number of such endeavours is not negligible. But they hardly appear to come directly under the category of the Technical Schools described above. They should more properly be considered as a part of an attempt to assist development of industries and to seek a solution, however, limited, of the problem of unemployment. With regard to the question of reorganizing these schools, we are afraid they cannot conform either to the artisan courses or the Technical High School courses in their entirety. Since most of these schools pursue a charitable or philanthropic mission, we cannot possibly impose on them a system which they cannot probably well digest. Yet we should encourage these institutions which are akin to trade classes to bring their courses of training more and more in parity with the curricula to be prescribed by the Board of Technical and Industrial Education, Bengal, in respect of trade classes or artisan courses as the case may be. We say this in the interest of evolving a uniform system of technical education in Bengal, by gradual stages.

## CHAPTER VIII.

### Senior Technical Schools and the Board of Apprenticeship Training.

119. As already indicated in Chapter III, there are at present five Senior Technical Schools (Government aided) in Bengal, viz.—

- (1) Ashanulla School of Engineering, Dacca;
- (2) The Calcutta Technical School;

- (3) Kanchrapara Technical School (B & A. Rly.);
- (4) Assam Bengal Railway Technical School, Pahartuli; and
- (5) Bengal Nagpur Railway Loco Apprentices Technical School, Kharagpur.

120. **Ahsanulla School of Engineering.**—As already mentioned the Ahsanulla School of Engineering is under the control of Department of Education. Regarding its reorganization, it is suggested that its scope of training should be expanded so as to develop it into an Engineering Institution of a higher standard.

121. **Other Senior Technical Schools.**—In order to appraise the organization and functions of the other Senior Technical Schools, a reference may be made to paragraphs 59-62.

122. **Board of Apprenticeship Training.**—The Board of Control for Apprenticeship Training which was set up in June, 1921, owes its origin to the recommendation of the Mookerjee Committee appointed by the Government of Bengal in 1919 to advise Government regarding arrangements for higher specialised training at the B. E. College to selected mechanical apprentices in the B. E. Railway Workshop. The Governing Body of the B. E. College had for some time past been considering the question of improving the training of Mechanical Engineers in Bengal. In 1918 they submitted a Report to Government and recommended that an attempt should be made to introduce a scheme in co-operation with the Railway companies by which their best mechanical apprentices could be sent to the B. E. College for higher theoretical training. It was this proposal of the Governing Body of B. E. College that led to the appointment of the Committee of 1919. The Committee recommended that training in Mechanical Engineering could be given only by combining practical training under commercial conditions with simultaneous theoretical training. They accordingly recommended that courses of instruction in workshops ought to secure the efficiency of the workshop instructors and at the same time allow suitable modifications to suit individual shops. They also recommended the establishment of a technical school at Kanchrapara where theoretical training could be co-ordinated with practical work. Another recommendation was that the lower classes in the Mechanical Engineering Department at the B. E. College should be gradually replaced by the Technical School at Kanchrapara and similar schools elsewhere. The Committee also stressed the need of a common standard of entrance to Apprenticeship for the courses to be taught at the Schools and for the final examination. To attain this purpose they recommended the creation of a central Board called the Board of Control of Apprenticeship Training. The general policy of the Board has, right from the outset, been to secure the co-operation of workshop authorities and thus co-ordinate workshop training of apprentices with theoretical instruction according to the capacity of each apprentice. The Board has thus sought to supply a body of trained men to fill positions of secondary authority in the industries of Bengal.

#### **Future reorganization.**

123. Now with regard to the future of these Schools and the Board, we are to consider:—

- (a) the reorganization of these schools to suit the growing needs of the province; and
- (b) the results achieved by the Board of Control for Apprenticeship Training and its role under the Scheme of technical and industrial education which we envisage for Bengal.

#### **(i) Reorganization of Calcutta Technical School.**

124. **Present organization of Calcutta Technical School.**—The courses offered by the School have already been described in paragraph 62.

Regarding the system of training and its scope, the Principal of the School offers the following observations:—

“The pupils of the Calcutta Technical School are mostly boys who are employed as apprentices in various industrial firms in Calcutta. Not all of them have passed the Admission Examination held by the Board of Apprenticeship Training, although under an ideal system only such boys as were found to have passed a standard test examination should have been taken in as apprentices by the firms. The prevailing practice of many firms was to take in at least a proportion of their apprentices on special consideration from amongst boys who were related to their old employees. Apprentices of this category also could join the Calcutta Technical School for particular courses of theoretical training. They were being admitted by the Principal on a rough test of their individual merit. It was not necessary that all the boys of the school should go up for the final examinations held by the Board of Apprenticeship Training. The boys not going up for such examinations could obtain certificates from the Principal on the completion of their respective courses of training, but this would not be regarded as Pucca certificates of the nature issued on the results of the Board Final Examinations.

The Calcutta Technical School now caters mainly to the requirements of the engineering industry. It is designed to meet only the demand of the local areas. In fact the organization of a technical institution should, as a matter of principle, depend very materially on the industrial needs of the locality, because unlike other forms of education, technical training cannot be standardised. No earnestness or benevolence on the part of Government can be of any help unless there are specific industries working in the locality where technical institution is sought to be established, and such industries offer their effective co-operation in the matter. If there is an adequate number of industries working in any place and such industries are found ready to co-operate, it should be possible to extend the system of the Calcutta Technical School by setting up an institution on the same model, making, of course, due provision for adapting it to the special needs of the locality, if any.”

It would be evident from the above that the present organization of the School does not follow definite principles in the matter of admissions and that its courses of studies do not conform to a well-regulated system of technical studies. Although the Board of Apprenticeship Training forms the pivot of the system, the School organization does not fully conform to its requirements for the reason that it has many other associated activities which do not relate to the tests imposed by the Board. In other words the school as organized to-day is the result of local convenience and financial considerations. The observations by the Principal as quoted above make this clear to a great extent. The chief merit of the school, however, lies in the organization of teaching on the basis of simultaneous theoretical and practical training. Our concrete proposals in respect of the Calcutta Technical School for reorganizing it into Central Polytechnic are contained in paragraph 196 of Chapter XIV.

#### (ii) Reorganization of the Railway Schools.

125. These schools impart a higher technical training than the Junior Technical Schools and the Kanchrapara Railway School provides facilities for training even higher than those envisaged at the Technical Intermediate Colleges under the proposed Scheme. Since our objective is that students passing out of Stage III will be admitted into the Kanchrapara School, we suggest that this school should be modelled on post-intermediate Technical College lines. The other Railway Schools may remain as special types intended to serve the needs of Railways, after their equipments and courses

of studies have been suitably strengthened to meet the progressive requirements of the province. With regard to the Kanchrapara Railway Technical School we propose the following reforms:—

(a) The school should provide for two courses, each for five years, viz.—

(i) *The Diploma Course.*—It will consist of first three years during which simultaneous theoretical and practical training will be given and of the last two years during which only practical training will be imparted.

(ii) *The Associateship Course.*—The Associateship course should consist of simultaneous theoretical and practical training for 5 years.

Students having undergone 3 years' theoretical training at the Railway school and simultaneous practical training at the Railway workshop proceed to Sibpur to receive two years' theoretical training. But this system of training has not produced satisfactory results. During the two years when the students receive theoretical training at Sibpur College, they lose contact with their employers, viz., the Railway authorities with the result that by the time they complete their theoretical training, they fail to receive any special treatment from the Railways. The main reason why their training is not given much practical value is that during the two years of theoretical training they lose touch with workshop practices altogether. The present reform is suggested to remove these drawbacks. This course may be organized in either of the two ways; (i) students may from the very first year be selected by merits or University examination results as recruits for the Associateship course or (ii) at the end of the third year the necessary bifurcation of courses may take place mainly on the choice of the students or on the basis of examination results. We recommend that the Associateship course should be regarded as equivalent to B E Degree. The courses of studies and laboratory arrangements should be organized on this basis.

126. **Merits of the suggested scheme.**—The proposed reorganization of the existing Diploma and Associateship Courses offers a number of advantages. In the case of the Diploma Course the additional advantage will be that while the theoretical training will be on the existing scale, the practical part of the training will be more intensive than at present. In respect of the Associateship Course, the advantages may be summed up as follows:—

- (a) The theoretical training will be of the same standard and scale as at B E. College, Sibpur, but will be more than what is now offered by the Associateship Course.
- (b) The practical part of the training will be more intensive than what is offered by the B. E. College and under the present Associateship Course.
- (c) Practical training at Sibpur is not conducted under commercial conditions, whereas under the proposed Associateship Course, the training will be under commercial conditions.
- (d) At Sibpur, practical training is arranged after the B. E. Course is completed. But under the present Scheme it will be simultaneous with theoretical training—an arrangement which offers distinct advantages in so far as the all-round efficiency of the training is concerned.

127. **Board of Apprenticeship Training to be abolished.**—Since the proposed Board of Technical Education is intended to control the existing system of technical and industrial education in Bengal, it would not be necessary for the Board of Control for Apprenticeship Training to continue, with its limited scope and purpose.

## CHAPTER IX.

## Engineering Education.

128. We find that Engineering education in Bengal is imparted mainly through the following institutions:—

Name of Institutions.	Courses of study.
(1) Bengal Engineering College, Sibpur.	(a) Civil Engineering; (b) Mechanical Engineering; (c) Electrical Engineering; (d) Metallurgy.
(2) College of Engineering and Technology, Jadavpur.	(a) Mechanical Engineering Courses; (b) Electrical Engineering Courses; (c) Chemical Engineering Course; (d) Junior Technical Course
(3) Kanchrapara Technical Institute.	(a) Mechanical Engineering Course; (b) Electrical Engineering Course
(4) Calcutta Technical School	(a) Electrical and Mechanical Engineering; (b) Plumbing and Sanitary Engineering; (c) Electrical Supervisors Course
(5) Ahsanulla School of Engineering.	Overseering and Sub-overseering
(6) Sub-overseering classes and artisan classes at the various Junior Technical Schools	Sub-overseering and Elementary Engineering.

129. Let us first of all see how far the needs of higher engineering education are satisfied by existing institutions. The cases of Calcutta Technical School and Kanchrapara School have been dealt with in the previous Chapter. Now we shall consider the scope of the two colleges, viz., the B. E. College at Sibpur and Jadavpur College. The B. E. College is affiliated to the Calcutta University and grants B. E. degree but the Jadavpur College is not affiliated to the University, mainly by choice and on account of its historical background and declared objectives. Yet the Jadavpur College enjoys a good reputation as an institution of engineering education in certain lines and its students are reported to be in good demand by industrial firms all over the country. The admission qualifications fixed by the respective Colleges are in parity and the higher courses of studies offered by the former do not appear to fall short of a degree course.

Since our objective is to evolve a regularised system of engineering education in Bengal, it should be our endeavour to place these two colleges under a common system and in parity with each other, in so far as the higher branches of engineering education are concerned. For the purpose, our suggestions are outlined in the following paragraphs.

130. **Drawbacks of two Colleges.**—We made certain specific queries to the institutions concerned and from the replies they have supplied, it appears that both the Colleges suffer from a number of handicaps. They are summed up here:—

(a) In the higher training in mechanical engineering there are two difficulties. In the case of those who go direct from school to the workshops, their standard of education is often insufficient to enable them to benefit from higher studies. On the other, by direct admission, the College produce students whose first contact with actual working conditions in an

Engineering Works may be at the age of 23 or more (and even then merely as an unpaid learner) when he is apt to find greater difficulty in adapting himself to the works. The suggestion is that sooner a lad begins to serve his apprenticeship at his profession, the better and the solution would be some form of sandwich system consisting of periods of full time workshop training alternating with similar periods of College training.

(b) The Jadavpur College suffers from an initial handicap in not being affiliated to the University, for its students do not enjoy the same status as those passing out of the Sibpur College. The Government patronage also is not available.

(c) It is very difficult for both the Colleges to secure the co-operation of industrial firms in giving the students thorough apprenticeship training in workshops which is essential for acquainting the young men with methods of large scale production, control of labour and factory discipline.

(d) The equipment of both the Colleges are reported to be old and inadequate. The mechanical Engineering laboratories and workshops particularly are not so well-equipped as they should be. In Europe and America laboratories and workshops of Colleges are mainly equipped with the gifts of machines and instruments from the manufacturers of these articles. Such gifts are to a certain extent considered as advertisement expenses by the manufacturing firms. In India the case is, however, very different. The expansion and improvement of laboratories and workshops are essential if a larger number of students are to be given theoretical and practical training at the College.

(e) There should be an efficient Employment Bureau to provide the students with suitable employment, for in the absence of vocational guidance, much wastage of talents takes place and also really capable engineers have to be satisfied with unimportant jobs in which there is no scope for the utilization of their training and knowledge

**131. Suggestions.**—It will be evident that the two Colleges suffer more or less from common handicaps. Having regard to their present organization and the growing needs of engineering education in various lines in the country, we feel that while early steps should be taken to remove these handicaps, we should suggest specific branches of training that the two institutions should deal with so that overlapping of activities, if any, may be avoided and greater efficiency of the training ensured. We have already proposed in the last Chapter that the Calcutta Technical School and the Kanchrapara Railway School are to be reorganized to impart higher specialized technical education including engineering education. The question may therefore be raised if the expansion and reorganization of these two Colleges will not result in some overlapping of activities. To this it may be pointed out that although the engineering education (Associateship) to be imparted by the Calcutta Technical School and Kanchrapara Technical School (when reorganized) will be as good as and even more efficient than, a B. E. degree and will largely meet the requirements of mechanical engineers, there will remain still a large demand for civil engineers and even mechanical engineers\*. Besides our industrialization is progressive and the potential needs also are large. So there is a large scope for such Technical Colleges as the Sibpur and Jadavpur Colleges. Subject to these remarks we suggest the following:—

(a) The Sibpur and Jadavpur Colleges should be regarded as the institutions intended to impart higher engineering education and to this end certain modifications in their course and organization are called

\*Dr. A. H. Pandya does not endorse the viewpoint contained in this part of the sentence—"To this it may be pointed out that although the engineering education (Associateship) to be imparted by the Calcutta Technical School and Kanchrapara Technical School (when reorganized) will be as good as and even more efficient than, a B. E. Degree and will largely meet the requirements of mechanical engineers . . ."

for. Civil Engineering should exclusively be left with the Sibpur Engineering College. It has already built up a reputation in this line and should be provided with larger staffs and equipment. We feel that this one College should be sufficient to meet the requirements of the province for Civil engineers.

(b) The other courses that the Sibpur College should maintain are mechanical engineering, electrical engineering and metallurgy.

(c) The Diploma and other Degree courses should be transferred from Sibpur College to the Calcutta Technical School and the Kanchrapara Railway Technical School after they are suitably reorganized.

(d) The Associateship course also should be transferred from Sibpur College to Kanchrapara Technical School and to Calcutta Technical School when reorganized into a Polytechnic, for reasons already stated in paragraph 125 of Chapter VIII.

(e) At Jadavpur while mechanical engineering and electrical engineering will be taught, it should specialize in chemical engineering in which it has been a pioneer in Bengal. We suggest that oil technology may be taken up as a special line for development at this Institution. On the lines of the Bombay University Department of Chemical Technology, this College may organize its chemical engineering section and may grant a degree, B.Sc. (Technical) and M.Sc. (Technical), after it is properly affiliated with the University.

(f) In view of the growing needs of such courses as (i) Naval architecture and Marine engineering, (ii) aeronautics, and (iii) Architecture, these courses may be added to the curriculum of studies at Sibpur College.\*

(g) The Artisan classes at Jadavpur constitute a special feature of its organization, but since this college should be reorganized on specialized lines, such classes should be abolished and in their place trade classes in specific lines may be organized. Two courses may be organized for 1 year or 2 years, one for student passing out of stage II and the other for students passing out of stage III in the Technical Intermediate College.

132. **Lower Engineering Education.**—Regarding the scope for improvement in the existing institutions imparting engineering education, our suggestions and proposals are contained in other Chapters dealing with the specific types of schools or institutions concerned.

## CHAPTER X.

### Technological Studies under the University.

133 The Indian Industrial Commission (1916-19) in making their recommendations suggested that (i) with the growth of industries in this Province, a department of general technological chemistry should be started in the Universities to meet the industrial needs and (ii) there should be an intimate contact between Universities, Government Department of Industries and organizations of industrial employers. The idea of the Commission was that such an arrangement would help to make the courses of training really useful to the industries of the province and thus enable the University students of these Departments to secure suitable employment in trade and industry. We may enquire as to how far these ideas have been translated into action by the Universities.

134. **Technological Departments of the Universities.**—The name "University College of Science and Technology" under the Calcutta University seems to suggest that the University authorities realized the significance of the remarks of the Indian Industrial Commission. Actually two technological Departments, viz., the Department of Applied Chemistry and the Department of Applied Physics have been organized and although they suffer from certain defects and drawbacks, the beginnings have been

\*Dr. A. H. Pandya suggests that Sibpur Engineering College should be organized, on the lines of the Massachusetts Institute of Technology, as an all-India Institute of Technology. Our terms of reference preclude us from considering the question from an all-India point of view.

in tune with the recommendations of the Industrial Commission. A brief reference to the course of studies under these Departments has already been made. Under the Dacca University, however, Applied Chemistry is taught in the Department of Chemistry but no full-fledged Departments of Applied Chemistry and Applied Physics have yet been organized there.

**135. Research and other activities.**—In both these departments research forms a special feature. Not only the scholars attached to the department by the University are engaged in their respective problems but also several research organizations of the Central as well as the Provincial Government offer financial help as scholarships to students, salaries to different operatives and provision incurring expenses regarding materials and equipments. Some of these researches are of fundamental nature, such as, spectroscopy and its application, study of vitamins and their nutritive value which are published from time to time in different scientific journals where some specified subjects of research is indicated by the relevant boards. Reports of the work are submitted to them and industrial processes are made available to the general public by the respective boards

**136. Utilization of the services of these Departments by the public.**—It is reported that the services of these Departments are from time to time requisitioned by public bodies and industrial concerns in solving special industrial problems. We are informed that of the researches successfully carried out by the Department of Applied Chemistry, one relating to new oil plastics evolved in the laboratory is being exploited by a commercial firm. Some public bodies have also requisitioned the services of the staff from time to time in solving important problems. In the investigation of the nutrition problem the department of Chemistry has, we are informed, done some useful work. The Department of the Applied Physics also is reported to have successfully investigated into a number of problems of interest to Agriculture and Industry. Besides, the two Departments are reported to have done useful research work for the Burma Government, the Calcutta Electric Supply Corporation, Oriental Gas Co., of Calcutta, Calcutta Corporation and the Indian Jute Mills Association. The Geological Survey of India also utilizes the Department of Applied Physics for ascertaining the qualities of different varieties of mica of Indian origin from time to time.

**137. Standardization of Instruments.**—In addition to the above activities, the Applied Physics Department maintains an instruments section where the work of standardising electrical instruments of different types, calibrating and repairing them if necessary is carried on. The instruments are supplied from various Government Departments such as All-India Radio, Royal Air Force, Indian Post & Telegraph Department, &c. as well as Industrial firms like Tata Iron and Steel Co., and Messrs. Balmer Lawrie & Co., Shaw Wallace & Co., and a number of other Indian and non-Indian industrial concerns have taken advantage of the department, in standardizing their equipments. We are further told that a number of designs of instruments and equipments have been designed and constructed by students of the department during their course of study and that these instruments are supplied to the different educational institutions of the province as well as industrial concerns

**138. Apprenticeship Training.**—The Department has, we are informed, organized apprenticeship training in the different sections of the workshop and laboratory for undergraduates including matrics and non-matrics and graduates of the University to learn practically the use of tools and the working of processes in the manufacture as well as the repair of various machines, instruments and equipments. The course of apprenticeship usually runs for a period of three years and usually every year a number of apprentices are taken in the place of those that have completed their course. A departmental certificate is issued and it is found that they can be employed without much difficulty.



139. **Certain desirable reforms necessary.**—We consider that the Technological Departments of the University should concern themselves mainly with higher researches in industrial subjects. They should mainly aim at turning out research workers and production experts in different lines. With this end in view, we suggest that the attached laboratories should be extended and strengthened. It is expected that industrial firms will refer to these departments many of their problems for solution, from time to time, as they are now doing. Since we are suggesting the organization of elaborate Research Laboratories at the Central Technological Institute, we feel that the Technological Departments and the institutions mentioned above will work in full collaboration in so far as industrial researches and experiments at their respective laboratories are concerned.

140. Then in the matter of distributing research problems among the various institutions such as the Central Polytechnic, the Serampore Textile Institute, and its adjunct the Silk Technological Institute as also the Technological Departments of the Universities, the Board of Technical Education will perform a very important role. There will be a standing Research Sub-Committee under the Board which will not only select subjects of research on various industrial problems but also distribute them among different institutions according to their respective capacities and equipments. The distribution of funds to finance all such researches will also be vested in the hands of this Sub-Committee.

141 **Relationship of the Board with the Universities.**—Since the Board in discharging its functions will have to come into contact with the Universities, in so far as their Technological Departments are concerned, it is desirable that the relationship of the Board with the Universities should be more precisely stated than has been done in the foregoing paragraphs. It is not our objective to bring under the control of the Board, the Technological Departments of Universities, but what we aim at is a close collaboration between the two independent bodies in the common task of promoting facilities of technical education and researches in Bengal. As the Board will consist of, among other members, representatives of the Universities, it is expected that the Universities will exercise through their representatives due influence on the policy and programme of the Board. Besides, in many of the Sub-Committees which the Board will set up for different groups of industries or specific subjects, some members of the staff of the Universities will find a place. Thus with the working of the Board, the Universities will be closely associated and we envisage perfect collaboration between the two bodies. Further the representatives of the Universities are also expected to be associated with the Research Sub-Committee and the Technological Departments will receive a due share of the funds to be allotted for the promotion of scientific researches in this province. *Vice versa* it is expected that the Universities also will accommodate representatives of the Board in the various Advisory Committees attached to their Technological Departments, so that mutual collaboration may be regular and effective. In order to settle all these questions, it should be one of the immediate tasks of the Board, after it is brought into existence, to enter into negotiations with the Universities. Further the Board will also negotiate with the authorities of the Universities for settling such questions as the affiliation of different degrees or courses (the proposed B Sc., Tech. degree at Serampore Institute, for instance) proposed to be introduced at different institutions under the Control of the Board.

## CHAPTER XI.

### Technical Training in Textile Industries.

142. **Importance of textile industries.**—In Bengal's economy textile industries comprising cotton, jute, and silk constitute a very important

factor. There are about 80 jute mills, 32 cotton mills and 2 silk mills in Bengal supporting more than 2·5 lakh persons, over and above an extensive handloom cotton weaving industry supporting more than 2·1 lakh people, a handloom silk weaving industry supporting more than 5,000 people and also a Jute weaving industry scattered in several districts of the Province. While development of these industries has already been quite large, there remains still a considerable scope for further expansion in the years ahead. Since the existing facilities for technical and industrial training are inadequate and suffer from certain drawbacks, as discussed hereafter, and also because the rate of industrial progress is largely conditioned by the efficiency of industrial training, we feel that the problems of Bengal's Technical education in so far as these industries are concerned are of great importance. We shall first of all, review the existing facilities of training and then suggest necessary reforms in different directions.

143. **Training for cotton textile industries.**—For training in cotton textile industries, the existing institutions are (i) Serampore Textile Institute, (ii) district and aided weaving schools, and (iii) peripatetic weaving schools and weaving demonstration parties

#### (i) Serampore Textile Institute.

144. The Serampore Textile Institute is the apex institution for imparting training in cotton and jute textile industries in Bengal. The Institute has got two Sections—the men's section and the women's section. In the men's section there are three distinct courses, viz, (a) Higher course, (b) Artisan course, and (c) Operatives Training Course.

145. (a) **The Higher Course.**—It extends over three years and includes instruction in all branches of Textile Technology. Candidates who have passed Schools Final (Science Side) Examination or the Matriculation Examination of the Calcutta University, or the Board of Intermediate and Secondary Education, Dacca, or have been trained in the Sub-Overseer Course in one of the Technical schools under the department and whose age does not exceed 21 years are eligible for admission to this course. Successful students of this course are awarded a Diploma entitled "Associate of the Bengal Textile Institute" signed by the Principal of the Institute and the Director of Industries, Bengal. Practical training of the students is arranged for in a local mill. According to special arrangements, the 2nd and 3rd year students are required to attend the mills once a week throughout the Session

146 (b) **Artisan Course.**—Candidates who are permanent residents of Bengal and possess fair knowledge in Bengali and arithmetic are admitted into this course of two years. Preference is given to the sons of weaving communities and there is no age limit. Successful candidates of this course are awarded certificates signed by the Principal

147. (c) **Operative Training Course.**—This course of 6 months has been introduced only recently. It imparts practical training in weaving on power looms (cotton). There is no particular admission qualification, but youngmen with a sufficient knowledge of Bengali and Arithmetic and not below 18 years of age are eligible for admission into this course. Successful students are awarded certificates signed by the Principal of the Institute. We are informed that the Bengal Mill Owners' Association have agreed to nominate two members on each of the two Committees (i) for the selection of candidates for admission and (ii) for examining the students after training and finally to maintain a register of successful students of this course for the purpose of finding employment for them as weavers in member mills.

148. **The Women's Section.**—It is similar to the artisan course in the men's section. It is intended to train up Bengali girls and women. The admission qualification is the same as in the case of the artisan course.

149. **Drawbacks of the system.**—The brief review of the present organisation of the Institute in the foregoing paragraphs makes it clear that the standard of training it imparts is not high enough to be of degree level. It reveals also a number of drawbacks which may be summed up as follows.—

- (a) That the training, is inadequate in several respects has become evident through experience for a number of years, for the scanty support which the Institute has so far succeeded in receiving from the cotton mills is an index to the inadequacy of the training for superior technical jobs in the industry. The training imparted by the Institute is not of such a high order as is required for meeting the requirements of all grades of personnel for the textile industries, such as supervisors, weaving engineers, installation engineers, etc
- (b) There are no sufficient arrangements for the trainees to receive adequate facilities for learning the practical aspects of textile technology with the result that successful students passing out of the Institute are not given much employment value by the industry nor are they in a position to start industries on independent lines; the 2nd and 3rd year students are required to attend mills once a week, but this training seems to be very inadequate as experience has amply shown. Besides, as our considered view is that a system of simultaneous theoretical and practical training produces the best results, the system of training at Serampore Institute necessarily falls short of our ideal and is as such deficient for our purpose.
- (c) Another drawback of the organisation is that although the Institute is the apex training institution in Bengal in respect of textile technology, it performs hardly any co-ordinating functions with regard to the District and aided weaving schools, peripatetic weaving schools and Demonstration parties. From discussions with the heads of various weaving schools, it has been borne upon us that these institutions receive hardly any benefit from the Serampore Textile Institute in the shape of improved designs, and other suggestions for technical improvements. The real position, seems to be that the entire organisation lacks co-ordination and a cohesive purpose.
- (d) Still another drawback is the absence of an adequate research section at the Institute. As a monotchnic, it should possess all the equipments required for carrying on researches in textile technology on different lines namely, cotton, jute and silk. There is, of course, a handloom research organization set up under the auspices of the Institute with the help of Central Subvention, but it is a small scale organization and relates to only one aspect of cotton textile industry in Bengal

150 **Improvements called for.**—Arising out of the drawbacks, certain improvements are clearly necessary to enhance the training efficiency of the Institute. These may be summed up as follows:—

- (a) The research section of the Institute should be organized on a self-sufficient basis and should include all equipments for carrying on researches in various problems of textile industries of Bengal. The functions of the Institute should thus consist not only in imparting advanced training and providing facilities for research in textile technology in all its aspects in order to equip them for occupying responsible positions in the industry, but also in providing a central research and analytical laboratory for the benefit of Bengal's Textile and chemical industries. The Institute will also co-operate, as a matter of course, with

mills and factories in carrying out industrial research on their behalf or investigating any technical problems that may arise in the course of their work. The scope of the existing handloom research section which has been functioning with the help of Central grants is very limited. It should be organised on a more comprehensive basis so as to render positive assistance to the development of Bengal's handloom industry by constructive researches into new designs, dyeing methods, etc.

- (b) Connected with the research section, there ought to be a fully equipped Department of Chemical Technology which will deal with the entire chemical aspect of textile technology. The standard of training imparted by this section should be of a degree level.
- (c) The Jute training section of the Institute will have to be expanded and strengthened by more efficient teachers and equipments.
- (d) The whole course of training at Serampore should be raised to the degree status and a degree of B Sc, Tech. (Textile) will be awarded, the Institute being affiliated to the Calcutta University and controlled by the proposed Board of Technical Education in Bengal.

151. **Admission qualifications.**—The minimum qualification required for admission to the degree course will be the passing of Stage III in the proposed system of technical education or the I.Sc., Examination of a University with Physics, Chemistry and Mathematics. Candidates coming from the general education side should be selected by a test examination to be instituted by the Board of Technical Education while students coming from the Technical Intermediate Colleges will be exempted from such examination.

152. **New lands and buildings to be acquired.**—As the inauguration of the new scheme will involve the addition of considerable equipment and staff, further building accommodation will be necessary. For this purpose new lands will have to be acquired in the vicinity of the present Institute.

### (ii) District and Aided Weaving Schools.

153. In Bengal there are altogether 9 District Weaving Schools at Malda, Birbhum (Suri), Pabna, Bankura, Tangail (Mymensingh), Begumganj (Noakhali), Zorwarganj (Chittagong), Khulna and Dacca. These schools impart instructions in simple handloom weaving and dyeing free of any charge. The course of studies extends to one year only. The number of students admitted for each year's course is limited to 20, each of whom is awarded a stipend of Rs. 4 per mensem. The expenditure of the schools is met jointly by the Department of Industries and the District Board. The other weaving schools which do not enjoy the status of a District Weaving School are much larger in number. The courses of studies taught at these schools differ little from that followed at District Weaving Schools. Jute Weaving forms a part of some District Schools as well as of private weaving schools. The only difference is in respect of control and financial provisions. While District Weaving Schools are provincialized and fully controlled by the Department of Industries, other weaving schools have to depend on aid from Government and District Boards. The management of such schools is not fully controlled by the Department, but the courses of studies are prescribed and the schools have to follow certain rules and regulations in respect of admission of students, equipments and teaching methods.

154. **Working results.**—The working of the weaving schools has revealed certain drawbacks which should, first of all, be referred to. Although these schools were meant for imparting training to both middle

class Bhadrolog young men and sons of hereditary weavers, the dual purpose has been served very inadequately, for, in the first place the sons of traditional weavers have not been largely attracted because traditional weavers do not consider the training imparted by the weaving schools as being helpful to their crafts and besides, cannot afford to spare their boys who assist them in their work to be engaged in the school for a number of hours during the day. Some weavers' sons are attracted, no doubt, by the scholarships offered, but since the amount of the scholarships is not large enough, the inducement is on the whole ineffective. In the second place, the middle class Bhadrolog boys after having passed the course find hardly any scope for employment in cotton mills or are so equipped as to be able to start weaving as an independent profession. The students passing out of Weaving Schools are admitted to the Artisan course of Serampore Textile Institute, but even after that their employability do not improve very much.

155. **Drawbacks of the system.**—From the above it would follow that the system of training and the organization behind it suffer from certain drawbacks. The main defects of the situation may be briefly stated as follows:—

- (a) The course of studies is very short and it is not possible for the teaching staff to impart a really useful training in different aspects of weaving within such a short period.
- (b) There are no suitable arrangements for practical training under commercial conditions with the result that the trainees remain ignorant about the industrial aspects of the trade.
- (c) The admission qualifications are so low that often boys of a very low order of intelligence are admitted, who can hardly derive the benefit of the training received.
- (d) The absence of well-qualified teachers.

156. **Suggestions for reforms.**—In view of the above considerations, the following reforms in the organization of the weaving schools are called for—

- (a) The course of studies for every weaving school should be for a period of two years. The course should include training in carpentry, smithy, fitter's shop, machine shop, etc., in order to equip the students with a sufficient technical knowledge about the appliances to be fitted up in a weaving establishment.
- (b) The minimum admission qualification should be education up to class VIII of general High Schools or preferably, completion of stage II in the Technical High Schools. Those boys who will have class VIII qualification only will have to undergo training in carpentry, smithy, etc., as provided for in the course.
- (c) There should be organized a Model Factory (as suggested in Chapter VI) attached to each school, so that the students may receive practical training under commercial conditions and may thus learn the technique of running an industry.
- (d) The Weaving Schools should be open to both middle class Bhadrolog boys and sons of weaving classes; subject to the usual qualifications as stated in (b).
- (e) The amount of scholarships should be increased so as to enable them to take advantage of training offered at the schools.
- (f) The qualification of the teaching staff should be of a higher order and equipments must be strengthened for more efficient training.

If these reforms are carried out, the standard of training imparted by the weaving schools will rise both in efficiency and in contents. If students after having completed the two years' course at the schools, undergo a

course of practical training for one year in the Demonstration Factory, they will turn out to be more efficient weavers and will be in a position to start independent business of their own. Instead of going through the one-year course at the Demonstration Factory, the students after having completed the two-year course may join the Higher course at the Serampore Textile Institute or they may enter cotton mills as apprentices.

157. **District Schools versus Aided Schools.**—Since there has been a distinction in status between District Weaving Schools and other weaving schools, the question is pertinent whether such distinction should be preserved and the principle of provincialization of weaving schools should be recognized as basis of a gradual process. We take the view that since public opinion is steadily veering round the deprovincialization of schools and colleges in the sphere of general education, we should not advocate a contrary principle. We feel that some district schools should be retained on the basis of reorganization suggested above, as model weaving schools so that the majority of the weaving schools may remain on a non-official basis, although they may be assisted by suitable financial grants, technical supervision, etc., by Government. We recommend this on the consideration that since technical education is not well developed in Bengal, Government should take some special care for fostering ideal schools, so that in course of time the entire system may be broad-based and efficiently organized. The question of selecting the District Weaving Schools which should be reorganized and retained as model weaving schools and the centres where they should be located should be considered by the Board of Technical and Industrial Education which we are going to propose.

### (iii) Peripatetic Weaving Schools and Demonstration Parties.

158. In the interim report submitted by the Technical Education Subcommittee of the Bengal Industrial Survey Committee on Reorganization Proposals for the Unemployment Relief Scheme and other Demonstration Parties a detailed examination of the organization, defects and possibilities of these Parties was carried out. Reference has also been made (*vide* Chapter XVI) to the reforms which are desirable for enhancing the working efficiency of the Parties. We endorse the same recommendations and should not, therefore, repeat them here.

### Training in Jute Textile Industry.

159. Until lately the Serampore Textile Institute provided for hardly any facilities for specialized training in Jute weaving and spinning. The Department of Industries, of course, maintains Jute Weaving Demonstration Parties, but as explained in Chapter XVI their scope of work and efficiency of training methods suffer from many limitations and defects. At the Serampore Institute training in jute weaving was imparted as a part of the general training in cotton weaving, despite the consideration that jute technology has its special aspects to be mastered by the students through special course of training. It was only two years back that a scheme for power jute weaving section was introduced and this is the only serious attempt that has been made to initiate a system of specialized training in jute weaving and spinning at the Serampore Textile Institute.

160. **The Power Jute Weaving Section.**—The Power Jute Weaving Section is the jute counterpart of the power cotton weaving plant already functioning at the Institute. The Scheme was introduced at a cost of Rs. 36,205 and comprises the following:—

- (a) Machines and accessories:—
  - (i) Two sacking looms.
  - (ii) Four Hessian looms.
  - (iii) One dressing machine.

- (iv) One spool machine.
- (v) One cop machine.
- (vi) One sewing machine
- (vii) One hemming machine.
- (viii) Eleven electrical motors with switches, etc.

(b) Staff —

- (i) One Jute Weaving Instructor.
- (ii) Six weavers
- (iii) One dresser
- (iv) Two cop winders.
- (v) Two roll winders.
- (vi) One sewing machine operator.
- (vii) One labourer.

161. So far as the above scheme is concerned, it is no doubt a distinct advance on the insignificant facilities which were previously available for training in jute textile technology. We are informed that the scheme has been launched with the approval of the Jute Mills' Association. It has been further reported to us that there is under consideration a scheme for the additional staff for teaching Chemistry and Physics with a view to improving the standard of instruction in these subjects. The Scheme, we are told, has been estimated to cost Rs. 9,504 per annum (average) recurring for the appointment of additional staff for teaching Chemistry and Physics to the Higher class students and a sum of Rs. 1,000 non-recurring for the purchase of an epidiascope and necessary lecture apparatus. The staff included consists of the following.—

- (i) One Lecturer in Chemistry.
- (ii) One Lecturer in Physics and Mathematics
- (iii) One Demonstrator in Chemistry.
- (iv) One Laboratory Assistant
- (v) Three Laboratory Bearers
- (vi) One labourer

162. **Our objectives.**—Since we are visualising an organization through which a sufficiently high and efficient standard of technical training in jute industry should be arranged in Bengal, the existing facilities will require to be further amplified and new institutions will have to be built up. The proposed additions of staff and equipments as indicated above will no doubt go some way in improving the present organization, but how far these will meet our requirements has to be judged in terms of our objectives. As suggested in case of the Cotton textile industry, our proposals for raising the standard of training in jute textile technology aim at the following objectives:—

- (i) The standard of training should be raised to the level of degree course which will include textile engineering. The degree will be named, as already suggested, B Sc. (Tech. Textile). The admission qualification should be the passing of stage III in the Technical Intermediate College or I.Sc. course.
- (ii) The Institute will provide for a Diploma course in jute industry so that, by passing it, students may become supervisors in jute mills. Students passing out of feeder schools mentioned in (iii) below will be admitted into this course.
- (iii) There should be organized feeder schools of the standard of Technical High Schools. Artisan classes for the training of jute-workers and their children should be attached to these schools.

163. **Some reforms suggested.**—In view of our objectives as stated above, it would appear that we require more organized facilities for the training of three categories of students, viz.—

- (i) The middle class Bhadrolog young men who have completed the course of training may take up the posts of managers, or engineers in jute mills or may start independent jute weaving industry
- (ii) The jute workers in the mills who want to be technically equipped so as to render more efficient service or to improve their service prospects.
- (iii) The sons and children of the mill operatives who will require training in artisan courses so that they may take up suitable jobs in the mills.

In order to meet the requirements of these categories of trainees, we envisage the following arrangements:—

I. The power loom jute weaving section as referred to above will serve the needs of the middle class Bhadrolog Youngmen. This section will have to be further strengthened and reformed in these lines:—

- (a) An well-equipped spinning section will have to be added.
- (b) A research section in jute technology will also have to be organized in conjunction with the cotton textile portion of the research arrangement at the Institute. Collaboration with the Technological Research Organization of the Central Jute Committee will be desirable.
- (c) For the practical training of the trainees, adequate arrangements will have to be made with local jute mills.

II. In respect of the training of jute workers, a detailed scheme has been drawn up (vide Appendix II).

The area schools will serve the needs of—

- (i) Training the sons and children of mill operatives for artisan courses;
- (ii) Training mill operatives in evening classes;
- (iii) Training Day Scholars in Jute

We recommend that the area schools should be of the standard of Technical High Schools and cover a curriculum of technical education with a specialised course in Jute. These schools need not have any workshop equipments, for their practical training will be arranged for in the nearby jute mills and their workshops, as these will serve the needs of mill workers and their children should also include primary classes attached to each and the lower primary classes should be free as intended under the Bengal Primary Education Act.

III. As regards the question of teachers, we are informed that it will not be possible for the mills to spare their skilled supervisors to serve as teachers in the feeder schools. We accordingly suggest that short teachers' training course may be started at the Institute at an early date for turning out skilled teachers for the various zonal schools in jute mills areas.

164 **The method of recruitment to jute mills needs overhauling.**—The above arrangements will, it is hoped, introduce radical change in the existing method of recruitment to jute mills. It is expected that the jute mills will readily agree to recruit their personnel from these institutions and not through the Sirdar system. The employees' sons and dependents should get preference over outsiders, if only they have received training in these institutions. The Sirdar system to which the mills have so long adhered has not been satisfactory at all. We are, therefore, suggesting the above arrangement to bring about a wholesome change in the existing method. This system will not only ensure a regular supply of trained personnel but also create a situation in which the actual and potential workers will feel attached to the jute mills by reason of their training and economic considerations.



### Training in Silk Technology.

165. The existing organization for imparting training in silk technology in Bengal comprise (i) the Berhampore Silk Technological Institute, (ii) Peddie Reeling Institute at Malda, (iii) Raw Silk Conditioning House in Calcutta, and (iv) Sericultural Research and Training Institute at Dum Dum. Of these institutions, the Silk Technological Institute is the oldest

#### Silk Technological Institute, Berhampore.

166. There are two courses of training offered by the Institute—an Artisan course and a Higher course.

(a) **The Artisan Course.**—The Artisan course is for two years. It is open to the sons of hereditary weavers as well as to middle class Bhadrolog youngmen. Mostly illiterate boys come to receive training under this course. Stipends ranging from Rs 4 to Rs 6 are offered as an inducement to the boys, but it has been found out in experience that these stipends are not of much help to the students. Since boys of the weaving classes have to assist their parents in pursuing their profession, they cannot be spared so as to enable them to receive training in the Institute. Further a stipend of Rs. 4 or Rs. 6 is not such an attraction that the weaving classes may send their boys to take advantage of it. So in so far as the training of the wards of hereditary weavers is concerned, the artisan course has not been a success. Then in respect of boys belonging to non-weaving classes, also the artisan course has not borne fruitful results because the boys who come to take this course of training do not possess any special aptitude for the work, which is generally found in weaving class boys, and necessarily they receive the training in an indifferent manner. Experience shows that as soon as the course is completed, they go out seeking jobs, although they do not possess the skill of a practical weaver.

167. (b) **The Higher Course.**—The course is of a duration of 3 years. Most of the boys are matriculates belonging to the middle classes. The various sections of the Institute are as follows:—

- I. *Development section.*—It will take measures for developing the industry, help organisation of weavers, foster marketing by standardisation, examination and certification of fabrics, carry out survey of demand and marketing. It will be staffed by a Conditioning Officer for examining and certifying fabrics, a production officer to look after organisation of weavers, for production of standardised goods, a Marketing Officer to deal with survey of demand and marketing and three assistants for these three officers. The Artist designer will also be attached to this section.
- II. *Weaving section.*—Under the Weaving Expert, this section will deal with processes of weaving and production of fabrics which are or are expected to be in demand in various markets and carry out experiments on new lines. This section will attempt to develop both throwing and weaving. The staff will consist of Assistant Weaving Expert with five expert weavers, Warping Instructor, Assistant Warping Instructor and Throwing Instructor.
- III. *Dyeing and printing section under Dyeing and Printing Expert.*—This section will deal with boiling off and dyeing of yarn and fabrics and printing, finishing of fabrics. The staff will consist of a Dyeing Instructor, a Finishing Officer, a Printing Instructor, a Block-maker and Printers. The section will attempt to develop dyeing and printing in the province.
- IV. *Engineering section under Weaving Engineer.*—This section will be in charge of all machinery and designing and experimenting with new machinery and suitable for the province. The staff will consist of Mechanic, Carpenter, Engine Driver and Fireman.
- V. *Training section.*—This section will be under the Assistant Principal and will deal with training of all students.

168. **The functions of the Institute.**—In accordance with the programme as set out for the different sections, the functions of the Institute have been specified as follows:—

*Function I.*—It will adopt measures for improving and developing the silk manufacturing industry of the province on up-to-date lines so that there may be increased demand for silk fabrics produced in Bengal not only in the province itself but also in other provinces of India and in foreign countries. With this end in view, the Institute—

- (1) will carry on experiments for improvement of (a) looms and appliances, (b) processing of silk yarn, (c) methods of weaving and (d) processes of dyeing, printing and finishing;
- (2) will carry on survey of demand;
- (3) will co-operate in measures to help production of standardised fabrics on a large scale by the silk weavers of the province;
- (4) will facilitate marketing of fabrics by finishing, conditioning and issuing certificates as to standard and quality of fabrics produced in the province;
- (5) will help actual marketing of silk fabrics produced in the province; and
- (6) will co-operate with and render all possible help to all organisations in the province engaged in the silk manufacturing industry.

*Function II*—It will impart—

- (a) a preliminary training in silk-worm rearing and reeling in order to give the students correct idea as to how the raw silk forming the raw material for silk fabrics is produced;
- (b) training in all branches of silk manufacturing on up-to-date lines, viz., processing of yarn, weaving of fabrics and designing, dyeing, printing and finishing. The training will include cotton weaving for ground work and will be both theoretical and practical but with greater emphasis on the practical side so that the licentiates may be fit to work as teachers of textile institutions or supervisors and managers of weaving factories and the licentiates and artisans may be able to organise and run throwing, dyeing, printing or weaving establishments on their own account.
- (c) fuller training in sericulture proper will have to be undertaken at the Sericultural Research and Training Institute and similarly a fuller training in reeling raw silk production and testing has to be undertaken at the Peddie Silk Reeling Institute and Raw Silk Conditioning House in order to entitle the students to certificates of training in these subjects.

169. **Practical results.**—Although the programme underlying the organization of the Institute with its different sections is ambitious enough, in actual working it has not produced any tangible results. From discussions with the Principal of the Institute and Deputy Director of Sericulture who until lately controlled the activities of the Institute, it was revealed that the students passing out of the Institute cannot secure employment nor are they fitted to start independent industries of their own. The deficiencies of the system of training are two-fold, viz., (i) the training received is defective inasmuch as the teaching staff are not so skilled and experienced as to be able to render practical help to the trainees and (ii) no facilities for practical workshop training have been arranged for the trainees. The result has been that because the boys receive an inadequate training without the practical skill, they do not find any employment in silk mills, although a few of them have been employed in some cotton mills. The whole scheme as conceived was a comprehensive one but since it has been given effect to in a piecemeal and unplanned fashion, it has failed to produce the results which the Institute was originally intended to aim at. As we have already emphasised in respect

of all Technical Institutions, simultaneous theoretical and practical training is the most effective method. Since the Institute does not provide for such a system of training, it fails in its essential objects as outlined in its prospectus. In fact it has already failed

170 **The causes of failure.**—The principal causes for which the Institute either in the Artisan Course or in the Higher Course has failed to achieve any satisfactory results may be briefly stated here:—

- (a) In the first place, the teaching staff has decidedly proved inadequate to the declared objectives of the Institute as may be evident from the lack of constructive initiative in respect of either training, or developmental work. The very fact that the Silk Industry in any aspect of it has not received any tangible assistance from the activities of the Institute is a confirmation of its failure.
- (b) The Institute is not equipped with any demonstration factory in which practical training can be given to the trainees in accordance with the system of simultaneous theoretical training and practical work.
- (c) There are no silk mills in nearby localities with which arrangements can be made for the practical training of the students.

171. **The question of Reforms.**—A reference to the cause of the failure of the Institute leads to the question of desirable reforms so that the Institute may be made into a highest Technological Institute for silk industry. We have given our most careful consideration to this question and our conclusions are as follows:—

- (a) Instead of allowing the Institute with all its equipments to function effectively at the centre where it is now situated, it should be transferred to Serampore to be amalgamated with the Textile Institute there subject to necessary adjustments. The Silk Technological Institute will form a distinct part of the Serampore Textile Institute and will impart such higher training in silk technology as is provided for in cotton technology under the Textile Institute.
- (b) It is not possible to remove all the cause of the failure of the Institute to fulfil its objects. For instance, we cannot help to establish suitable silk mills nearabout the Institute. But this deficiency can be removed to a great extent by the organisation of a demonstration factory to be attached to the Institute at Serampore.
- (c) The amalgamation of the Silk Institute with the Textile Institute is justified and will ensure considerable economies in costs as well as organisation on account of the following consideration:—
  - (i) There are certain processes such as dyeing and printing which are common both in cotton and silk mills. Details may vary, but the processes are almost the same. Besides in order to start work in silk, the students have to practise first with cotton yarns.
  - (ii) Considerable economies will be secured by amalgamating the Silk Institute with the Serampore Textile Institute in point of costs and organisation. For instance, the same research laboratories will serve the purposes of both silk industry and cotton textile industry. Besides, considerable economies will be achieved not only in staffs necessary, but also in the purchase of raw materials and in administration costs.
  - (iii) Besides the facilities offered at the proposed demonstration factory, it will be possible to arrange for practical training for students in the few silk mills nearabout Calcutta.
  - (iv) The proximity to Calcutta which is the centre of trade and commerce is to be considered as a factor of advantage.

- (v) The training processes in cotton technology and silk technology arranged for in the Institute will provide a good scope for a comparative study by students and create an atmosphere of healthy emulation. The standard of training imparted by Serampore Textile Institute in its present organisation is decidedly higher than that provided for in the Silk Institute at Berhampore. Since we are visualising a still higher standard of training at Serampore, the silk institute when amalgamated with Serampore Institute will have to be so organised as to raise the standard of training to an appreciably higher level of efficiency. Hence it is expected that the amalgamation of the two branches of training arrangements in Textile Technology will ensure more satisfactory training in silk technology.
- (vi) The environments available at Serampore will be of a distinct advantage to the trainees from the standpoint of corporate life.\*
- (d) At Berhampore there should remain a District Weaving School along with the Artisan Courses suitably reorganised on the lines as suggested in case of District Weaving Schools generally. The Berhampore Weaving School should impart training both in silk and cotton weaving. While the Weaving School will remain open to Bhadralog young men as well as sons of traditional weavers, the artisan classes should be intended only for the weaving community. Greater inducements in the shape of larger stipends should be offered to the sons of the weaving classes.
- (e) The reeling portion of the Silk Technological Institute should amalgamate with the Peddie Reeling Institute at Malda which should remain as the highest organisation, for improving the reeling industry and for imparting training in reeling.

**172. Different Departments of the Serampore Textile Institute.**—In view of the various reforms which we have suggested above in the existing arrangements for training in textile industries, we may now sum up the organization of the Institute which, according to our suggestions, should constitute the highest central institution for training and research in textile technology in Bengal. The different Departments of the Institute would thus be as follows:—

- I. Cotton Technology Section—
  - A. The Higher Course (Degree Course).
  - B. The Artisan Court.
  - C. The Women's Section.
- II. Silk Technology Section—
 

There will be taught only the Higher Course (Degree Course).
- III. Jute Technology Section—
  - A. The Higher Course (Degree Course).
  - B. The Jute Weaving and Winding Operatives' Course.
  - C. Teachers' Training Course.
- IV. The Research Section—
  - A. The General Research Section
  - B. The Chemical Technology Section.
  - C. The Handloom Research Section.

**172A. The Institute to be renamed Bengal Government Institute of Textile Technology.**—Since we are recommending substantial reforms in the organization of the Institute, and also envisage further developments in future, we suggest that the Institute should be renamed Bengal Government Institute of Textile Technology, Serampore

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\*Mr. S. C. Mitter wishes it to be recorded that he does not subscribe to the proposal for amalgamating the Silk Technological Institute at Berhampore with the Textile Institute, Serampore.

173. **Relation with District Weaving Schools and other Institutions in the Districts.**—The proposed Central Textile Institute should exercise a due influence on the progress and improvement of textile industries all over the Province. As such the various institutions in the districts, viz, the District Weaving Schools, the Peripatetic Weaving Schools and Parties should be in constant touch with the activities of the Institute, specially in its Research Section. Industrial products are gradually becoming highly specialized things, partly on account of foreign competition and partly on account of the superior goods produced in other Provinces. So the Handloom Research Section should carry on researches and experiments with the deliberate object of assisting the handloom weaving industry of the province by the supply of new patterns, designs, weaving methods, etc. These designs and experiments should naturally be propagated to the actual weavers through the various Weaving Schools, Peripatetic and Demonstration Parties. Besides, the Teachers' Training Course proposed to be introduced under the Institute will also train up efficient teachers for the various Schools and Parties, so that weaving education may be passed on to the students through really capable teachers.

## CHAPTER XII

### Training in Tanning and Leather Technology

174 Since leather industries of Bengal are rapidly developing and their role in the economy of the province is of increasing importance, the questions of organizing adequate facilities for training in tanning and leather technology are also of urgent importance. The principal sections of the leather industries of Bengal are tanning and shoe and leather goods making. As a result of the endeavour of the Bengal Tanning Institute, the tanning industry of the Province is now increasingly taking to the modern western processes and most of the commercial tanneries are operating on a factory scale. The necessary power-driven machines are employed in the production of leather and there is some demand for trained machine-workers in these tanneries. It is estimated that nearly 3,000 operatives mostly coming from provinces outside Bengal, find employment in the tanneries in the neighbourhood of Calcutta alone. Usually raw or partially trained men are recruited in these tanneries where they are subsequently trained. The manufacture of shoe and leather goods is another important and growing industry in Bengal. It is estimated that in Calcutta more than 8,000 Bihari muchis are employed in the workshops under the control of the Chinese shoe-makers and in the numerous small shoe-making establishments run by the muchis themselves. Bihari muchis or cobblers are also found in district towns and even in the remotest villages of Bengal.

175 **Present organizations for training.**—As the present moment facilities for training and research in leather technology available in Bengal centre round the Bengal Tanning Institute. The functions of the Institute may be divided under three heads, viz, (i) training, (ii) demonstration and propaganda, and (iii) research and experiments. A brief reference to the activities in these sections of the Institute will reveal the present organization and also the existing drawbacks.

#### (i) Training

176 Training of students in tanning and technology of leather is an important function of the Institute. The course of training is of two years, one year being devoted to work in the demonstration tannery and the other being devoted to the chemical laboratory. At the tannery students are taught the methods of manufacturing the principal varieties of commercial leather, e.g., leather for shoe uppers, sole harness, bags and trunks, fancy leather articles, belting, picking bands, laces, etc. At the laboratory they are taught the methods of industrial chemical analysis of water, soap, oils and fats, vegetable tanning materials, other chemicals used in tanning, dyes,

leather, etc. We are informed that at the end of the two years' course the Department of Industries awards a certificate in tanning to successful students. Since 1927 when the course was first introduced altogether 82 students have passed out. It is reported that the majority of these students have become absorbed in tanning and allied trades as tanning assistants, tanning demonstrators and teachers and leather chemists. Some of the students are reported to have established independent tanneries also.

177 **Diploma course in tanning.**—An improved and higher course of studies, viz, a diploma course has recently been introduced at the Institute. It is a three-year course the syllabus of which is higher than that of the two year Departmental Certificate course. The Institute has been affiliated to the Calcutta University and its equipment and staff have been increased for the University Diploma Course. The object of the higher University Course is to recruit students of a better calibre for training as leather chemists and technologists competent to hold responsible technical jobs in the leather industries of India.

178. **A Higher Course to be introduced at a subsequent stage.**—We feel that the introduction of the Diploma Course has been a right move. In order to render this course quite efficient, the staff and equipment of the Board should be sufficiently strengthened. The proposed Board of Technical Education should watch the progress and development of leather industries in the province, so that in the light of the experiences gathered by the Diploma Course, a higher degree course may subsequently be introduced.

#### (ii) **Demonstration and propaganda**

179. The object of demonstration is to train up such young men in district and subdivisional towns and villages as may be interested in learning modern processes of tanning and shoe-making. Such training in tanning is being imparted through two Peripatetic Tanning Demonstration Parties and training in shoe-making through four Peripatetic Boot and Shoe-making Parties. A detailed review of the working of these parties was carried out by the Technical Education Sub-Committee of the Bengal Industrial Survey Committee and their findings on their working and scope of work reveal certain defects in the organization and also their limited utility. Their main conclusions in respect of the tanning and shoe-making demonstration parties are:—

- (i) that their main concern should be to train the traditional muchis and chamars;
- (ii) that it was a mistake to intend these parties to train up middle class Bhadrolog young men; and
- (iii) that for middle class Bhadrolog young men, special Trade Schools should be organized in specific centres in accordance with local convenience.

The observations of the Sub-Committee in support of these conclusions are as follows:—

“The experience of the past, however, reveals that these Parties have not met any substantial success in attracting middle class boys in the mufassal to the shoe-making industry and much of their energies has had to be devoted towards the removal of the traditional bias against this line of business. Although the prejudice has considerably disappeared by this time, it is difficult to say how far this phenomenon is to be attributed to the endeavours of the Demonstration Parties; a welcome change in the outlook of our middle class young men in favour of numerous professions which were previously condemned has been brought about in recent years by sheer economic pressure. This new outlook is indicative more of a general change in their attitude than of a readiness on their part to take up the particular profession of shoe-making in large numbers. The past experience of the Shoe-making Demonstration Parties does not, therefore, furnish any reassuring evidence in regard to the potentiality of the scheme, so far as middle class young men are concerned.

“The discussions which the Sub-Committee had on this subject with the Superintendent, Bengal Tanning Institute, have led them to the conclusion that it was a mistake to set up these parties primarily for young men of the Bhadrolog class. In the opinion of the Sub-Committee such Parties were more urgently called for by the vast number of chamars and muchis, scattered all over the Province, who had lost their caste profession and sorely needed to be reinstated in their traditional business through effective methods of training. There are strong reasons to believe that if the Shoe-making Parties had been organized for the training of this traditional class, their endeavours would have borne fruitful results ”

We endorse the above findings of the Sub-Committee and recommend that these demonstration parties have an utility for the traditional Chamars and Muchis and should be suitably reorganized to meet their needs more effectively. As we have indicated in the Chapter on “Training of Cottage Workers”, the lines on which the equipment, teaching staff, training methods and organizational aspects of the parties need improvement, we need not recapitulate our suggestions here. We may only point out that according to the latest census report, there are nearly 6 lakhs of Muchis and Chamars spread over different district of Bengal. Although manufacture of leather, shoes and leather goods is their caste profession, they have been completely ousted from their hereditary trades on account of their ignorance about the improved system of work. What they need, therefore, is proper training in the manufacture of leather shoes and leather goods with up-to-date methods and implements. This alone can enable them to regain their lost footing and improve their miserable economic position. How and to what extent their earning can be increased will be evident from the wages and the income of the tanners in the up-country and South Indian tanneries and shoe workers employed in Calcutta and other parts of India. The average earning of an efficient mistry trained in modern tanneries varies from Rs. 30 to Rs. 35 per month while in the case of a skilled shoe-making or a leather goods mistry the average goes up to Rs. 50 per month. In the big shoe-making centres of India, like Agra, Lucknow, etc., people belonging to the Charmakar community run shoe-making establishments of considerable size yielding a fair income and they have raised themselves to the status of factory owners and employers of men. What has been possible with the Charmakars of other provinces may also be possible here, if the Bengal Charmakars are efficiently trained up in modern methods of tanning and leather work. Poverty and illiteracy have kept the Bengal Charmakars absolutely ignorant of and indifferent to, possible means of improving their trade and have deprived them of all enterprise. Even if they want to improve their lot they cannot afford the expenses of the necessary education and training. The mufassal Charmakar boys are unable to come down and live in Calcutta to get the training at the Bengal Tanning Institute. We are, therefore, going to propose that in those districts in the mufassal where the Charmakar population preponderates, the demonstration parties should be posted to impart training in leather industries to the benefit of the mufassal Charmakar boys. Any improvement in the economic condition of the large number of Charmakars will react upon the general well-being of the Province and it is, therefore, of primary importance that the number of these parties should be sufficiently increased and they should be reorganized on the lines suggested by the Technical Education Sub-Committee of the Bengal Industrial Survey Committee

180 **Leather Trade Schools.**—We have already referred to the need and utility of regional Trade Schools in Chapter VI and since leather industries in many areas offer handsome prospects of development and suggest the need for suitable training organizations in these areas, we feel that there is a distinct need for setting up leather trade schools in certain districts of Bengal. In the Five-Year Plan for Industrial Development in Bengal (1937) the Department of Industries suggested the establishment of Leather Trade

Schools as substitutes for or to replace, Tanning and Shoe-making Demonstration Parties. We do not agree with this viewpoint, for the role of Leather Trade Schools is to be distinctly different from that of the Demonstration Parties. We may just draw an analogy by referring to the relationship in which the District Weaving Schools stand to the Peripatetic Weaving Parties. Leather Trade Schools also would bear more or less a similar relationship to the tanning and shoe-making parties. The proposed Leather Trade Schools will be open to the middle class Bhadrolg boys as well as to the boys of the artisans who can afford to receive the necessary training at the Leather Trade Schools. A scheme for the establishment of District Leather Trade Schools is furnished in Appendix III. It will be the duty of the Board to determine the number of schools necessary and the centres where they should be established.

### (iii) Research and experiments

181. The Institute carries on researches on different aspects of leather industries comprising (i) investigations into the raw materials of the tanning industry, (ii) experiments to adapt western processes of tanning to local conditions with a view to attain the western standard in the quality of leathers manufactured in this country and (iii) work on the fundamental problems of the science and art of leather making. It is claimed that successful researches have been carried out in respect of many vegetable tan-stuff preparations such as synthetic bate, chrome extracts, pigment finishes, leather polishes and dressings.

182. **Further expansion of the Institute.**—The activities of the Institute in its different sections have no doubt attained a measure of success and due to its activities mainly, a large number of Bengali boys have taken to leather industries in some aspect or other, while the traditional antipathy of the people to anything relating to leather has been largely overcome. But since we feel that as a monotchnic the Institute should be further developed so as to be a fully equipped organization for turning out first class leather technicians, the Institute would need expansions and reforms in several directions. Our suggestions in this respect are as follows:—

- (1) The Institute should be renamed "Bengal Government Institute of Tanning and Leather Technology".
- (2) Expansion of the building and installation of adequate tanning machinery.
- (3) Establishment of a Boot and Shoe and Leather Goods making Department in Calcutta (*vide* Appendix IV).

The Institute owns no doubt a boot and shoe-making department which is located at 110, Surendra Nath Banerjee Road, premises of the Calcutta Technical School, but the scope of training it imparts is limited and the equipment it possesses are also inadequate to meet the growing needs of trainees who come to the Section. Experiences of the Section so far fully justify the establishment of a full-fledged organization as an annexé to the Tanning Institute, for the growth of modern shoe and boot-making industries and also of the shoe-wearing habits of the people in this country point to a need for such an organization.

- (4) Better arrangements for workshop training for the students of the Tanning Institute.

The Institute possesses a work-shop of its own, but it is not a full-fledged factory and the conditions of commercial training are not well satisfied by the existing arrangements. So the question may be considered, if it is possible to take over the management of an established factory, and make arrangements thereunder for the practical training of students. Or it may be possible to set up a Commercial Tannery under Government management for giving a course of practical training to the students of the Tanning



Institute Such arrangements for practical training are indeed called for in view of the considerations that a system of simultaneous practical and theoretical training yields the most efficient and satisfactory results. In framing the syllabuses of training at the Institute in all its sections, this consideration should be carefully kept in view

183 **The Institute in relation to the Peripatetic Demonstration Parties.**—Since the Institute will serve as the highest organization for training and research in leather industries, its natural role *vis-a-vis* the District Demonstration Parties and Schools when set up will be one of specialized guidance and supervision. At present the few peripatetic Demonstration Parties now functioning are under the administrative control of the Superintendent of the Institute We feel that because of the technical nature of the work involved, the existing arrangements need not be changed

## CHAPTER XIII

### Scheme for a Wood Working Institute in Bengal

184. **Extent of wood working industry.**—The wood working industry in Bengal has not received the attention that it deserves, for it is so familiar and commonplace an economic activity that the importance of its size or its possibilities have not been fully assessed. The industry covers a very wide field from the large log yards and workshops to the small artisans who make little toys for little children Every stratum of the industry has its own economic importance and special problems to solve Roughly the industry as a whole may be divided into three strata, viz :—

- (a) Large scale units, such as log yards, saw mills and large workshops like those of the Calcutta Tramways and Railways where building materials are manufactured;
- (b) Medium-sized units such as furnishing concerns run on a commercial basis in cities and towns; and
- (c) The numerous small scale cottage units scattered in the rural areas of the Province.

185 **Number of artisans in the industry.**—The number of people engaged in the industry were according to the census returns 168,593 in 1921 and 161,565 in 1931. An industry which maintains so many people must have a great economic importance of its own, specially in view of the fact that there remains a large scope for improvement and progress in each of the three strata of the industry. The productive technique in the medium sized industrial units as well as in the rural wood working establishments, which are carried on as hereditary occupations, is still crude in many respects and requires to be improved by the introduction of better appliances and better designs In order to improve the prospects of the wood working industry no special experiments and research have so far been made in Bengal and there are hardly any well-equipped institutions for the purpose in this province. The need for a Wood Working Institute in Bengal has, therefore, been very keenly felt for a long time, for it is under the auspices of such an institution that valuable and productive researches can be carried on for the benefit of the wood working industries in diverse directions. Accordingly a scheme for a Wood Working Institution has been drawn up (*vide* Appendix V). The scheme is self-explanatory If it is carried into effect, it may be hoped that it will render much valuable service for the improvement of the wood working industry of Province

186 **Possibilities to be developed.**—In view of the fact that special interest is being taken in the establishment and promotion of small cottage industries, the demand for reliable information on small scale wood-using industries is very urgent In normal times India used to import large quantities of wooden articles such as shuttles for jute and cotton mills,

hobbins, rollers and other textile machinery fittings, tool handles, picture-mouldings, toys, mathematical instruments, sports goods and many others. If adequate researches and experiments are carried on to ascertain what woods to use for different purposes and whether these and other articles can be economically manufactured, there is no doubt that many small wood industries may grow up to the benefit of unemployed youngmen. In the interest of the sports goods industry in Bengal also investigations and experiments are called for. For the manufacture of cricket bats and hockey sticks, for instance, Bengal possesses no raw materials and have to import finished goods from Sialkot (Punjab) and foreign countries. As willow and mulberry grow plentifully in Kashmir, Sialkot has been able to develop a large and variegated sports goods industry. It is understood that in the Darjeeling forests willow and mulberry wood are available and can be cultured, if special efforts are made in this respect. There is no doubt that the proposed Institute will be in a position to carry on experiments with Bengal woods and thus reveal possibilities not yet known.

187. **Future possibilities to be kept in view.**—To assess the prospects of the wood working industry in Bengal, we must think in terms of possibilities. The future prospects of the industry obviously depend on the availability of proper and adequate raw materials. As no comprehensive survey of Bengal's raw materials has so far been made, the limitations are still unknown. The Forest Department is reported to be engaged in investigations and undertaking experiments with new types of wood. Hence it may be expected that adequate investigation may reveal many more suitable raw materials than are at present known and that research and experiments may make it possible to discover new uses for our available resources, so that the wood working industry of the province may receive an impetus in many directions.

188. **Requirements of cottage workers.**—There is no doubt intensive experiments and research for devising new uses for our available wood resources are called for. The small cottage workers may even learn to make new things like toys, new designs of household furniture, etc., all of which may have a larger demand than before. For this purpose, they require training and knowledge. The hereditary workers in the country side are mostly illiterate and hardly appreciate the necessity for sending their boys for any sort of technical education with the result that the industry is more or less in a stagnant position. Such a situation does not lead to progress whatsoever. Hence what is necessary at present is education and more particularly, technical education for the younger generation so that they may carry on new lines of manufacture. As there is likely to be a demand for new designs and more artistic goods, such education will be productive of quite appreciable material benefits to the wood workers. It is in view of these considerations that the question of a Wood Working Institute in Bengal is very urgent at the present stage of Bengal's economic development.

189. **Functions of the Institute.**—At present some of the technical schools in Bengal either under the control of the Department of Industries or receiving grants-in-aid from the Department offer elementary courses in wood working, but no school can be said to possess a fully equipped organization which can efficiently improve the wood working crafts of the province and introduce better methods of working with improved tools and appliances and better designs and to train men as skilled artisans in the various branches of the craft. Necessarily a Central Wood Working Institute in Bengal on the lines as suggested in the scheme, which will bear certain features in common with the United Provinces Government Central Wood Working Institute at Bareilly, will train up (i) hereditary artisans, (ii) Bhadralog young men who may turn out to be efficient demonstrator-teachers for the wood working sections of technical schools and (iii) carry on research work into the uses of Indian timbers. Thus the Institute will seek to improve the technical efficiency of the wood working industry as a whole.

190. **Relation with the wood working sections of District Technical Schools.**—Since the Wood Working Institute is intended to be the apex institution for imparting training in the industry, it is desirable that it should have a necessary connection with the wood working sections of technical schools in the district. The connection may be organized in these forms:—

- (a) The Institute will advise on the courses of studies to be followed in the wood working sections of the various schools
- (b) It will provide out of its students teachers for wood working sections in the Technical Institutes of Bengal.
- (c) It will also arrange for a wood working teachers' refreshers' course for maintaining the efficiency of teaching in the schools.
- (d) The Institute will also conduct the final certificate examination for the students of all technical schools who have had completed the wood working course. The examination may be instituted by the proposed Board of Technical Education.

191. **Location of the Institute.**—The question of the location of the Institute also received our attention. Calcutta with its extensive wood working industry, an expansive market and other facilities such as transport, availability of labour, etc., would appear to be a suitable site for such an Institute. Some may argue in favour of locating it away from Calcutta area and at a centre where already a nucleus of an Institute exists. This would be in conformity with the policy of assisting other mofussil areas to grow into industrial importance or in other words, decentralizing industrial development as far as possible. Although these considerations have some force, we are of the opinion that the site of the Institute should be located in proximity to Calcutta where facilities of transport, power and raw materials are considered favourable. The question of the selection of the site is, however, left to be decided by the proposed Board of Technical Education, which body, we hope will take into account considerations of all relevant factors and circumstances

## CHAPTER XIV

### A Scheme for a Central Technological Institute in Bengal

192. The need for a Central Technological Institute in Bengal has been emphasised by many experts and several enquiry committees on some important grounds. In the first place the organization of an Institute consisting of several Departments of training can ensure considerable economy of space, staff arrangements, workshop arrangements and ultimate *per capita* expenditure. In a poor country like India where industrialization has just started, this consideration for economy is necessarily very important. In the second place, the organization of several departments of training under one parent institution means the creation of a healthy social atmosphere in which not only the trainees stand to gain but also the teachers can have the benefit of profitable collaboration among themselves. Another important consideration is that students while specializing in certain technical lines can have the opportunity of acquainting themselves with other branches of technical training not covered by their courses of studies. Thus a technical sense is more easily developed by students in a Central Technological Institute than in particular branches of training organized in isolation from one another.

193. **Polytechnic versus monotechnic.**—We do not like to refer here to the old controversy as to the relative merits of Polytechnics and monotechnics, for considerations of local needs of the industries to be served and the nature of industrial development should always determine the types

of institutions to be built up. Referring to this question Mr. John Sargent, Educational Adviser to the Government of India, observed in his Memorandum on Technical Education in Bengal as follows:—

“The size of the area to be served and the extent and nature of its industrial development will determine whether such instruction should be provided in one institution or in several. If in several, then similar considerations will indicate whether these institutions should each serve one industry or group of industries or whether there should be a central institution at which the more advanced work in all branches should be concentrated, with ancillary schools, conveniently distributed, which will relieve it of the more elementary work and feed it in turn with suitably prepared students. The question of monotechnics *versus* polytechnics has been a controversial issue over a considerable period but in my opinion the polytechnic, wherever practicable and subject to certain exceptions to be mentioned, has a strong balance of educational, industrial and economic argument in its favour.”

We feel that we may endorse these view-points and also agree with him that “the monotechnic is to be preferred only where an industry is highly localized, or where its needs are so complicated or peculiar that it is difficult to satisfy them in the same building as those of other industries or where the material to be dealt with, as in tanning, makes it an uncomfortable neighbour”. Following these principles, such monotechnics as the Serampore Textile Institute for training in textile industries and the Tanning Institute at Pagladanga require no justification.

194. **Scheme suggested by Mr. Sargent.**—In his Memorandum on Technical Education, Mr. Sargent proposed a scheme for a polytechnic in Bengal outlining its general features in some details. In accordance with his scheme, the principal Departments should be as follows:—

(1) *Science Department*—This should be devoted almost exclusively to applied science. It will require three small laboratories for advance work in Chemistry, Physics and Botany and five large laboratories for—

- (a) General Physics;
- (b) General Chemistry;
- (c) Botany and Biology;
- (d) Oils, Fats, etc.;
- (e) Building Science or Metallurgy.

(An Applied Mechanics Laboratory to be shared between the Civil and Mechanical Engineering Departments should be provided in or near the Workshop Block.) There should be two or, if possible, three lecture rooms.

(2) *Mechanical Engineering Department.*—This will require, in addition to the Applied Mechanics Laboratory referred to above, workshops for Metal, Wood, Machine Tools, Fitting, Heat treatment of Metals including Welding, Heat Engines, Automobile Repairs and a Foundry.

(3) *Electrical Engineering Department*—It is assumed that the demand will be sufficient to justify a separate department from the beginning; if it is not, this department may be combined with the Mechanical Engineering Department. It will require, in addition to an electrical laboratory, workshops for installation and wiring, electrical machinery and probably a separate room for Telegraphy, Telephony and Wireless, with a small room for Photometry.

(4) *Civil Engineering Department*—In the early stages provision may be made in this department for the Building Trades and in the Art Department for Architecture; ultimately a separate department for Architecture and the Building Trades may be found necessary. The initial accommodation should include a building science laboratory (unless the laboratory already suggested for the Science Department is sufficient), a wood and metal workshop (unless it is possible to share those belonging to the

Mechanical Engineering Department), plumbing shop, and rooms for painting and decorating, cabinet making and wood-carving, brickwork and masonry

The Engineering Departments will need between them four drawing offices and two lecture rooms

(5) *Commercial Department*.—This will require in addition to ordinary class rooms, special rooms for typewriting, geography, commodities and retail trades. A shop window for display may be shared with the Art Department

(6) *Art Department*.—This will be devoted mainly to industrial and commercial design. It too requires in addition to several studies for General Design, Architectural Drawing, Poster Work, etc., workshops for pottery, art metal work, silversmith and light crafts. Printing is a most desirable addition but unless gifts or loans can be obtained from firms in the trade, the cost of obtaining and maintaining up-to-date plant is very heavy.

195. Now we may consider how far these suggestions can be fitted into our proposed scheme of technical and industrial education which requires the provision of simultaneous theoretical and practical instruction in mechanical and electrical engineering and inclusion of trade classes covering many trades. The first two colleges are types by themselves and have grown up on lines which it would not be very easy to remodel to suit the requirements of a Central Technological Institute under the scheme proposed here. We take the view that since our requirements of engineering education are expansive, we have need of such institutions and those may be rendered more useful and efficient for our purpose by suitable reorganization. The Calcutta Technical School may be considered as a suitable nucleus inasmuch as its organization has grown up on the basis of simultaneous theoretical and practical training and on the basis of diversified course.

196. **Present Organization of Calcutta Technical School**.—Now we shall see how far the present course of the Calcutta Technical School satisfies our requirements. The present organization of the Calcutta Technical School, leaving aside the question of equipment and standards of training imparted in each section, falls short of the scheme proposed by Mr Sargent in many directions. Since our objective is to create new organizations only to the extent of our present and potential needs in the near future, we should avoid the risk of recommending any redundant institutions which are not justified by our requirements thus assessed. We do not suggest that Mr Sargent's scheme should be copied in its entirety in organizing the polytechnic. Having regard to the training arrangements which now exist at Sibpur and Jadavpur and the desirable reforms in these institutions which we have recommended, our concrete proposals in respect of the Calcutta Technical School in the event of its being transformed into a Central Polytechnic are as follows:—

I. The Polytechnic should have the following Departments:—

- (a) the Science Department should generally be on the lines of Mr. Sargent except Building Science which forms a part of Civil Engineering;
- (b) Mechanical Engineering Department,
- (c) Fuel Engineering;
- (d) Refrigeration and Air Conditioning Engineering;
- (e) Metal Technique Engineering;
- (f) an Art Department;
- (g) a Technical High School;

(h) Trade classes in a number of trades such as food processing, printing, electroplating, book-binding, photography, block-making, etc., as may be selected in the light of relevant considerations.

II The Associateship course which is now offered by the Sibpur, B. E. College, should be transferred to the Calcutta Technical School when turned into a Polytechnic

III. The Polytechnic need not have a Commercial Department, for there are already a good number of institutions which, although not organised under a system, are reported to be imparting the training in a sufficient scale. Hence it is apprehended that the creation of a Commercial Department, may lead to some duplication of efforts. A fuller consideration of this question, however, is postponed till a later stage, for it is not proposed to cover the subject of commercial education within the purview of our present Report.

IV. The Polytechnic is not to have a Civil Engineering Department, having regard to the traditions that the Sibpur B. E. College possesses in the matter and the existing requirements of Civil Engineers, we feel that the Sibpur College may specialize in civil engineering.

V. The Polytechnic will not also have a department for textile technology for we are suggesting the organization of a separate full-fledged Textile Institute (*vide* Chapter XI) comprising the textile group of industries with the present Serampore Textile Institute as its nucleus.

VI. The existing Ceramic Institute under the Department of Industries should also be reorganized and form a section of the Polytechnic. A tentative scheme of reorganization is furnished in Appendix VI. The special reasons for bringing the Institute into the orbit of the Polytechnic are (i) that unless the Institute with its present limited scope of work is brought under the influence and guidance of a comprehensive organization, it will not ensure really constructive results, and (ii) that in isolation it will not grow into a healthy and premier institution for ceramic industries in this part of India

VII. Industrial Research will form an essential part of the activities of the polytechnic. Research and investigation of technical problems facing the industrialists of the Province from time to time should be a primary concern of the Institute. These would not only serve as the basis of promoting the industrial development of the country, but also create enough confidence in our technical men to undertake more and more responsible work. At present the practice of the industrial firms in India is to refer their problems to foreign experts. The necessity of such reference would be dispensed with, if the Central Technological Institute has the necessary equipment for undertaking such work. Incidentally such an arrangement will help the cause of widening the available facilities for apprenticeship training, for if valuable services of the kind can be rendered to the industrial firms, it may be possible to persuade them to take in a larger number of apprentices from such men as may be recommended by the Institute.

197 **Site for the polytechnic.**—Regarding a suitable site for the proposed polytechnic, the Chairman of the Committee had discussions with Mr. John Sargent and several educational experts of this Province. Three alternative proposals were considered in this connection, viz, (i) the Curzon Park near the Esplanade Maidan; (ii) the Bentinck Street; and (iii) the existing site of the Calcutta Technical School. Of these, the Bentinck Street was not considered suitable, for it is rather undeveloped and out of the way from tram routes. The present premises of the Calcutta Technical School is no doubt suitable by virtue of its being centrally situated but the area covered by it is only about 2 acres, whereas according to Mr. Sargent, the Polytechnic should have at least 10 acres of land, exclusive of hostels and playing grounds. The Curzon Park is no doubt

an ideal site, but on account of its present utility to the public and nearness to the Government House, it may not be possible to acquire it for the purpose. The actual selection of a site, on the basis of a fuller examination of relevant questions, is, however, left to the proposed Board of Technical Education (*vide* Chapter XIX).

## CHAPTER XV

### Art and Industrial Education

198 **Art should form a part of technical education.**—In our examination of the scope and contents of technical education, the problem of art education should also claim our attention. Inasmuch as art raises the æsthetic standard of life and life comprises many departments of activities, we cannot afford to ignore the question of art education. There was a day when art was considered to be a subject of patronage only by nobles and royal courts and it had hardly anything to do with the economic life of the common masses. But we have long outgrown that stage. Now art has been commercialized for raising the æsthetic standard of living for the high as well as for the humble in the society. The relationship of art with our ordinary life in this age is briefly indicated in the following quotation:—

“Even an artist must work for a living, and it is therefore, but proper that attention is devoted to the study not only of what are called the fine arts like painting, sculpture, and architecture, but also to the cultivation of the humbler but no less important spheres of decorative designs. Art in order to be vital cannot be a matter merely for the museum or the picture gallery, it must permeate every nook and corner of life. We must seek to erect buildings, whether they be private houses, public offices and even factories, which have some architectural merit; we must use in our houses furniture which not merely serve the purpose for which it is designed, but is also artistic and beautiful; the advertisements exhibited at our railway stations or in our streets must not be those crude productions which we often see and which are possibly the heritage of the Victorian age, an age which the historian of the future will probably condemn as wholly inartistic.”

It would thus appear that art education should even in this materialistic age form a necessary part of our system of technical and industrial education.

199. **Place of art in Indian Industry.**—How far India developed her art in the industrial sphere is, of course, a history which we need not recount here in details. There was a time when India achieved considerable reputation for producing a rich variety of things, so much so that many of her arts and crafts gained a world wide celebrity. The European nations prized the wares of India, the silk brocades, the muslins, the printed cottons, the shawls and carpets, enamels and gem-set jewellery and many other articles—not merely for their utility but also for their artistic beauty. In those days the people in India and the skilled craftsmen, who satisfied their requirements and tastes, possessed a remarkable beauty and fitness, which they displayed in their houses, alike in articles of luxury and of every day life. Those were the days when Indian craftsmanship, originality and technical execution were unexcelled. Indian goods even set the fashion in Europe and Indian arts were the envy of its best craftsmen. Indian filigree work inspired the jewellers of Venice and her printed cottons, the textile works of France, and her shawls were copied by the manufacturers of Paisley. But those days no longer exist and India's arts and crafts have undergone a sad deterioration in course of time. Speaking of the present position and the future possibilities of utilizing art in improving industrial development, Mr. B. C. Laha, a Bengali artist, observes:—

“Now we come to the machine age and mass production, when a great change took place everywhere. As in England in the beginning of the new

age there was, an appalling era of industry divorced from true art, though of false art, of over-decoration, archaism and disguise there was plenty, so in India the artistic taste of the people has steadily deteriorated and many beautiful crafts have decayed or are fast dying out. Quantity and cheapness seem to be the only aims and quality and fitness of very minor importance. At such a time what can be of greater importance than the encouragement of good design and right decoration (and such decoration may consist of even simple, clean lines)—in general the improvement of the æsthetic qualities of our industrial products, not only of hand-made articles but also, and chiefly, of the products of large scale manufactures ”

“A time must come, and let us hope it will come soon after the war, when it will be possible to demonstrate in such exhibitions of art in industry as ours a high level of artistic achievement, not in some special or several restricted spheres as at present but in the whole range of industry, for the element of beauty has a place of its own everywhere. A fuller recognition of such artistic achievement will have the most beneficial and stimulating effect on the public taste and will bring new joy to our homes. A wider demand will result in a brighter future for our industries. At the same time the artist will become a more important factor than he is now admitted to be in this country, for he is indispensable not merely for the purposes of advertisement and display. In industrial production many new fields for work need him and need him most urgently. The distrust of art and that good design does not pay are old beliefs which have been slowly but surely undermined. Beautiful shape, fitting design and joyful colouring—all these the trained artist can create and create in such manner as to satisfy the needs and tastes of the times. The practical industrialist of today will readily acknowledge what an asset such an artist would be for the expansion of industry, for everywhere efficient production with beauty is what should be aimed at. Thus the co-operation of industry with art will prove of incalculable and abiding value to our country.”

200 **Need for co-operation between art and industry.**—We share the views expressed above. Our problem is thus to organize adequate facilities for such co-operation between industry and art in the country. At the present time there are two Art Schools in Calcutta, viz, the Government School of Art and the Indian Art School which impart training both in fine art and commercial art. We shall examine the syllabuses of studies of these two schools so as to ascertain how far they are adequate or efficient for our purpose.

201. **Syllabuses of studies at the two Art Schools.**—Briefly the courses offered by the two Art Schools in Calcutta are as follows:—

I. The Government School of Art—

- (a) Fine Art;
- (b) Indian Art;
- (c) Commercial Art;
- (d) Draftsmanship;
- (e) Lithography;
- (f) Wood engraving;
- (g) Clay modelling; and
- (h) Drawing Masters' Course.

The object of the School is stated to be to teach the Fine Arts, Decorative Arts and Crafts and to provide instruction in Commercial drawing, painting and designing. The school also trains Drawing Masters for education institutions.

II. The Indian Art School—

- (a) Drawing including Drawing Teachers' Course;
- (b) Painting;
- (c) Photography;



- (d) Engraving;
- (e) Draftsmanship;
- (f) Art Printing;
- (g) Modelling;
- (h) Commercial art including commercial designing and book illustration, etc.;
- (i) Crafts;
- (j) Sewing and needle works, etc. (for girls); and
- (k) Other allied subjects.

The objects of the schools are stated to be:—

- (1) To impart instructions in the different branches of Fine and Commercial Arts and Crafts.
- (2) To train up Drawing Teachers for High Schools affiliated to the University of Calcutta and for Schools and Colleges recognised in the sister provinces.
- (3) To coach girl students in Drawing, Painting and Sewing, etc., for the Matriculation Examination according to the new syllabus of the University of Calcutta.
- (4) To give short-period-training in Drawing on special arrangements to candidates seeking admission into Engineering Colleges and other technical institutions, or intending to appear in competitive Government Examinations demanding proficiency in Drawing as a qualification.
- (5) To foster an æsthetic sense in Indian youths and help them in the proper appreciation of the inner significance and beauties of Art by holding annual exhibitions of works done by artists of different grades.
- (6) To help the study of modern Photography by training in negative making, bromide enlargements, and retouching and finishing both in black and white and colours.

202. **No great impression created by these two schools.**—From the syllabuses of the two schools and their teaching experiences, it appears that while the Government School of Arts attaches more importance to Fine Arts, the Indian Art School to Commercial Art. We are not in a position to fully assess the achievements of these schools in developing industrial art in Bengal, but from our discussions with many people, we are convinced that these schools have not as yet been able to make tangible impression on the development of industrial art. The reasons for such limited results may have been (i) tardy growth of public interest in commercial art in this Province and (ii) the absence of a creative urge behind the functioning of the two schools. One other reason may be that none of these schools seems to pursue a deliberate policy to improve the indigenous arts and crafts in the manner in which the United Provinces Government School of Arts and Crafts in Lucknow is doing.

203. **The Government School of Arts and Crafts, Lucknow.**—A brief reference may here be made to the United Provinces School of Arts and Crafts. The courses offered by that School are:—

(A) Art—

- (i) Fine Art;
- (ii) Architectural design and Draftsman;
- (iii) Drawing Teachers' Training; and
- (iv) Drawing for Reproduction.

(B) Arts and Crafts—

- (i) Goldsmith;
- (ii) Silversmith;
- (iii) Iron and heavy metalwork;

- (iv) Litho process (Litho and Photo Mechanical); and  
 (v) Woodwork (Cabinet work, Wood carving)

While some of the subjects are common with Calcutta Schools of Art, the special feature in the organization of the United Provinces School is an exclusive section for imparting training in arts and crafts. We are informed that all classes in this section are primarily intended for *bona fide* sons of artisans who are admitted free, but students other than artisans taking these subjects will pay monthly fees mentioned for each class, for eleven months in the year. The course extends over five years as the course under the Fine Art Section.

**204. Need for a comprehensive organization.**—In view of the limited scope and usefulness of the courses offered by the two schools at Calcutta, the question of establishing a more efficient and comprehensive organization for teaching industrial and commercial art seems to us to be quite urgent. While the two Art Schools have their own utility in the special spheres they have chosen, we feel that in any scheme of technical education which we may suggest, this aspect of the question should receive due consideration. The Department of Industries, Bengal, entertains the services of an artist while the Industrial Museum also has an artist attached to it. We are not aware of any positive steps which the Department may have taken for improving the artistic side of Bengal's cottage industries, with the help of this staff. It was expected that this staff and the Handloom Research Section at Serampore Textile Institute, maintained under Central Government grant, would provide useful and commercial designs for being taken up by the cottage industries of Bengal. But on the basis of available information we consider that hardly any services in this respect have yet been rendered. In view of these considerations we have suggested the creation of a fully equipped Art Section in the Central Polytechnic (vide Chapter XIV) to be organised in Calcutta. The special objects of this section will be to develop industrial and commercial art on up-to-date lines and to develop a progressive contact with the industries, so that the industrial development of the Province may receive its inspiration on the artistic side from this organization. Since we have already proposed that there should be a Handloom Research Section under the Serampore Textile Institute to develop new designs and patterns, it is necessary to clarify the role of the Art Section of the Polytechnic *vis-à-vis* the Handloom Research Section of the Institute. The Art Section will concern itself mainly with training just as the Calcutta Government School of Arts is doing; only it will interest itself in industrial and commercial art and leave out fine art from its scope. As such the Art Section will have to draw upon the results of researches and experiments successfully carried out by the Handloom Research Section of the Serampore Textile Institute. The Art Section is also expected to draw upon the achievements of the Central Wood Working Institute in the matter of creating artistic designs and patterns.

**205 Methods of encouraging artistic industrial designs.**—Apart from the organization of an Art Section at the proposed Polytechnic, special measures should be taken to encourage the creation of industrial designs suitable for utilization in industrial production. A reference may in this connection be made to the wholesome practice of organizing competition for various art designs from time to time by the United Provinces Department of Industries and Commerce. A judging committee is appointed and entries are invited from the public. We quote here a few rules which the United Provinces Government usually prescribe in connection with such competition:—

- “(1) All designs submitted should be the original work of the exhibitor and should not be copies of any existing design.  
 (2) The designs entered may be on paper or fabric.  
 (3) The winning designs will be the sole property of the Department.

- (4) It should always be remembered that the designs should be technically practicable.”

We feel that some such devices should be followed here in Bengal also. Non-official bodies often organize art exhibitions, although their main purpose may not be the encouragement of industrial art. The Art in Industry Exhibition which is annually organized under the auspices of Messrs Burma Shell & Co., since 1940, specially aims at promoting industrial art in the country. We feel that such periodical exhibitions have a great utility for the progress of art education.

**206 A Sub-Committee suggested.**—In view of the absence of adequate organizations to stimulate industrial art in this province, we suggest that under the auspices of the proposed Board of Industrial and Technical Education, a special Art Sub-Committee may be constituted to deal exclusively with the task of developing industrial art on proper lines. The Officer-in-charge of the Art Section of the Central Polytechnic, the Principal of the Government Art School and the Director of Industries should, among others, be members of this Sub-Committee. The functions of the Sub-Committee may be as follows:—

- (a) Co-ordinate the facilities of industrial art education in Bengal, by prescribing syllabuses, rules, etc., and holding examinations
- (b) To conduct competitions from time to time for industrial designs to be invited from (i) private individuals and (ii) institutions.
- (c) To suggest ways and means of propagating industrial designs to cottage workers.
- (d) To render assistance to organized industries in the form of designs, if and when required.

After the Sub-Committee is constituted, one of its early tasks should be to consider the question of reorganizing the Government Art School on desirable lines so as to enhance its efficiency and render its training more useful to the industries of the Province

## CHAPTER XVI.

### Training of Cottage Workers.

**207. Suitable training in cottage industries essential for progress.**—Since the number of cottage artisans among industrial workers in Bengal forms a substantial part and on their efficiency depends the production of a large number of industrial goods such as handloom textile fabrics, cutlery goods, brass and bell-metal wares, etc., it is imperative that any scheme of industrial education that we may evolve for Bengal must provide for suitable training facilities for such workers. It is true that in past days several of Bengal's cottage industries catered to international markets, for their products had achieved a very high degree of artistic perfection, but in these days those old crafts have lost their importance in competition with machine-made goods. Today there is a clear need for improvement not only in productive technique but also in the designs of products that are turned out. These improvements are desirable to meet changing tastes and fashions. So the traditional cottage workers are badly in need of (i) new labour saving technique, (ii) methods of standardised production, and (iii) new designs so as to be able to cater to the needs of a changing society. For all these they require adequate training facilities without which their trades and crafts cannot achieve a dynamic progress.

**208 Existing facilities of training for cottage workers.**—Now the question is whether the existing facilities are adequate to meet the requirements of the cottage workers. It may be generally said that in Bengal, three types of institutions were intended to serve their requirements, viz., (i) Industrial Schools, (ii) District and Peripatetic Weaving Schools and (iii)

Peripatetic Demonstration Parties But on an examination of the results achieved by these institutions, it appears that the effect produced on the cottage workers by the activities of these institutions has been limited or unsatisfactory for a number of reasons Let us consider the role of these institutions in so far as the training of cottage workers is concerned.

### (i) Industrial Schools.

209 Regarding the role of Industrial Schools, the Indian Industrial Commission (1916-18) observed as follows:—

“The industrial school is, at best, a defective instrument of education owing to the non-commercial conditions under which it must necessarily be carried on. In spite of this, it seems to be the only means by which the indigenous artisan can be trained; though, in the past through his ignorance and lack of education and through the imperfections of their equipment and teaching staff, industrial schools have failed in the majority of cases to achieve any appreciable results, while, therefore, within the limits just specified, we regard them as altogether unsatisfactory, if employed to train artisans in organized industries.”

These criticisms are also echoed by the United Provinces Cottage Industries Committee in their Report in the following words.—

“As regards the training of artisans, it is true that many schools were intended primarily to cater for men in the trade and that a number of them still have ‘artisan classes’ Various attractions have been offered to cottage workers to join them A large number of subsistence stipends are provided, no fees are charged, demonstration parties are sent out to explain new devices and popularise the schools among artisans; low educational qualifications are prescribed. In spite of all this, the result has not been by any means satisfactory It may fairly be said that though artisans do some time send their children to these schools, they rarely go themselves, presumably because they do not find the training imparted to them to be of sufficient practical use It might be no exaggeration to say that skilled artisans often consider that the teachers at the schools, who are supposed to teach them, do not know as much as they do themselves On the other hand, however, cottage workers and other artisans generally tend to take a narrow view, viz., practical results measured by immediate monetary gain.”

Since the Bengal conditions are almost the same as in the United Provinces the same conclusions may be reached with regard to the efficiency of industrial schools to train cottage workers in Bengal.

210. **Heads of Institutions and District Administration consulted.**— With a view to ascertain the experience of the different industrial schools and the District authorities in Bengal in the matter of training cottage artisans and their views on the necessary reforms to be carried out in the existing arrangements for the purpose, we issued a special questionnaire to which illuminating replies have been received. There is almost a consensus of opinion that the industrial schools have failed to impart to the cottage artisans an efficient industrial training which they can utilize to their advantage and by which improve their handicrafts The principal reasons adduced by them are:—

- (i) Lack of a commercial basis of the training imparted;
- (ii) Inadequacy and poorness of equipments; and
- (iii) Lack of good teaching staff

These drawbacks were mentioned by the Industrial Commission in their Report as well as by the United Provinces Cottage Industries Committee as

quoted above. Here we may mention a few extracts from the reports received from some of the heads of industrial schools and District Authorities.—

(a) "The main defect of Industrial Schools seems to be its unremunerative commercial conditions. Only men of some means can get in and poorer section, who supply the unskilled labour, seldom find scope to become skilled. If the artisans are made to contribute something by their labour the School would not have to depend mainly on Government aid and if the profit accruing is shared with the artisan students, they won't be wholly a burden to their family during training. In every subdivisional headquarter there should be one Artisan Technical School "

(b) "The main defect of these institutions is that trained students are not taught how to manufacture things on a commercial scale so that they may stand competition in the open market. These institutions will certainly be better utilized and be more effective only, if they can learn how to turn out cheap commodities in general demand which may enable them to set up business concerns on their own account.

Artisan schools would be of very little practical value and would hardly justify the expenditure incurred in organizing and maintaining them. The main indigenous Cottage Industries of the District are (1) Pottery, (2) Carpentry, (3) Conch-shell cutting, (4) Smithy, (5) Clay modelling, (6) Sola hat-making, (7) Shoe-making, (8) Handloom and (9) Bell-metal manufacture.

They generally supply local needs (except conch-shell cutting and hat-making) and are followed by the semi-literate or illiterate people of the comparatively lower stratum of society who take training from the village workshops. Bhadrolog unemployed youths are seldom attracted by these callings and there is much room for doubt, if the introduction of artisan schools would remove their aversion to manual labour. It is, however, suggested that if the Industries Department can introduce simple manually worked machines or contrivances to show increase in the outturn of the products and improvement in their quality, they may demonstrate the working of such machines to the existing craftsmen of suitable centres with the help of peripatetic department men".

(c) "*The problem is two-fold*—There is need for training men for the cottage industries which are purely handicrafts. On the other hand, large organized industries require men with an entirely different type of training. The type of institution and training described in the Industries Department Bulletin, after abolishing the present distinction between the two classes of artisan and technical course, can serve the purpose of only the large scale organized industries. They are of no value to cottage industries, except perhaps to a limited extent in carpentry and smithy

The cottage industries in the area that our Institution serves are, leaving out weaving—

Carpentry;

Smithy;

Bell-metal work;

Pottery;

Tanning, shoe-making,

Basket making;

Lacquer work;

Oil-pressing

It is obvious, at a glance, that the courses of instructions laid down in the bulletin either for the artisan or the technical course do not envisage a training ground for the industries of the type named above. And it is only to a limited extent that such training can be of use in carpentry and smithy mainly for the reason that the apparatus, implements and power used at the training institutions would in most cases be not available to the trained worker in his field of work when he returns home. Even the very articles manufactured as a part of training at the training centres are such as are quite unknown in the market where the student will have to sell his goods. If these institutions have to serve the village carpenter and smith, the training should be modelled accordingly and should, neither in the goods

made as training nor in the apparatus, implement and power, be divorced from the reality that the trained man would have to face on his return home."

211. The above observations while indicating the drawbacks and problems of the present institutions, point out *inter alia* the lines of reforms which must be carried out, if the training imparted by the industrial schools should bear efficient and practical results. We have proposed in Chapters VII and XI re-organization of the existing Junior Technical Schools, District Weaving Schools as well as the Artisan Classes and we consider that the reforms suggested by us, if carried out, will render the training of cottage workers much more efficient and of more practical utility to them.

### (ii) Peripatetic Weaving Schools and Demonstration Parties.

212 Regarding the efficiency of the Peripatetic Weaving Schools and Demonstration Parties as institutions for imparting training to cottage workers, we have before us definite findings of the Technical Education Sub-Committee of the Bengal Industrial Survey Committee as contained in their interim Report on "The Proposed Re-organization of Unemployment Relief Measures and Demonstration Parties." The Sub-Committee has made a detailed examination of the whole question of training cottage workers, and their findings in this connection have an importance which we feel we should recognize in our assessment of the services of these institutions in the matter of imparting suitable training to cottage workers. It appears from this report that the scheme of peripatetic schools and Demonstration Parties has not succeeded in imparting the necessary training to the cottage workers on account of a number of causes, of which some were (i) general, applying to the activities of the Demonstration Parties and others (ii) special, that apply to specific Demonstration Parties and are to be traced to certain inherent deficiencies in their respective organizations. We do not like to go into the details of each defect here but shall sum up the drawbacks as follows.—

#### (1) General causes—

- (a) inadequate qualifications of the Instructors,
- (b) absence of commercial conditions in the system of training;
- (c) absence of financial facilities, and
- (d) absence of marketing facilities;

#### (2) Special causes—

- (a) shortness of courses;
- (b) defective selection of Centres and industries;
- (c) unsuitability of methods of training to locally available raw materials;
- (d) unsuitability of tools and appliances;
- (e) training in the manufacture of goods with restricted demand; and
- (f) deficiencies in the system of training.

213. **The basic deficiency of the Scheme.**—In detailing the various defects of the scheme, the Sub-Committee appropriately indicated the basic deficiencies of the peripatetic schools and Demonstration Parties in these words:—

"The scheme, as it stands now, presents the anomalies of a hybrid growth. It does not satisfy the needs of the Bhadralog class; nor does it meet the requirements of the cottage workers completely. As a method of training, the scheme is found unsuited for either of these two classes of people. Young men of the Bhadralog classes who are handicapped by the absence of industrial traditions and outlook require to be put through a prolonged and intensive course of training. They have to be trained in the actual processes of manufacture and the training in their case should be brought up to the standard that should enable them to act as small entrepreneurs, which means that their technical training should be adequately broad-based and supplemented with knowledge of allied commercial matters.

In fact, as emphasised at the very inception of the Unemployment Relief Scheme, 'the intention is that every young man so trained will work the processes with his own hands so that he may understand the actual practical difficulties and skill required and may thereafter bring his organising ability to bear on improvement of the processes now followed by caste workers by employing and instructing them in the improved methods involved' The traditional cottage workers, on the other hand, require a much shorter course of training. What they need most is a training in improved methods and designs, such as should help them to obtain larger earnings from their respective industries. The requirements of the two classes are much too different to be met by identical methods of training

The failure of the scheme was no doubt due, to a considerable extent, to the absence of suitable financial and marketing facilities. But this fact should not prevent an examination of the nature and efficacy of the training given by the Demonstration Parties. The problems of finance and marketing are, in a sense, common problems that are of concern to all kinds of industries. These have a special significance for small industries not only those comprised in the Unemployment Relief Scheme but also for the much larger number of such industries which are outside its scope. Finance and marketing constitute two distinct problems by themselves and require separate treatment "

**214 Peripatetic Schools and Demonstration Parties—The only suitable agencies for training cottage workers.**—Since the viewpoint urged in the above remarks is based on a careful analysis of the results of working over a number of years, we endorse the conclusion that these demonstration parties are only suitable for imparting training to the cottage workers. In this connection we may appropriately quote the very words of the Subcommittee —

"It should, however, be stressed that the Demonstration Parties represent an educational method that is admirably suited for cottage industry workers who are widely scattered all over the province. As a matter of fact a number of them which are in essence itinerant training institutions were organized by the Department of Industries long before the initiation of the Unemployment Relief Scheme and the activities of some of these have borne excellent results. Special mention may in this connection be made of the Peripatetic Weaving Schools whose endeavours have led to the almost universal adoption of fly shuttles by the handloom weavers of this province and have as a consequence materially improved the economic prospects of the industry. Not only in Bengal but in other provinces also Demonstration Parties are now assigned a place of importance in the whole scheme of technical education, as by such institutions alone the benefits of training in improved methods can be reached to the vast number of cottage workers in the countryside. The economic considerations and their traditions make it impossible for them to be trained in regular technical schools. Even in some of the advanced industrial countries of Europe where particular industries are still being conducted on a cottage basis the organization of itinerant training institutions has been found necessary for training the workers in more efficient methods on the lines revealed by latest scientific research. In Sweden, for instance, where handloom weaving of special types of textile fabrics is still extensively in vogue, there are a number of Demonstration Parties organized by the State whose function is to move about in different weaving industries and give the weavers a training in methods of better economy and efficiency. In Bengal as in other provinces of India, it is now recognized that the Demonstration Parties constitute an ideal agency for the training of cottage workers particularly in the matter of the demonstration of the actual results obtained from research and experiments in improved processes of manufacturing cottage products "

**215 Certain reforms are called for.**—While endorsing the above viewpoints, we do not mean to suggest that the existing number of parties which

are functioning are sufficient for the purpose or that the particular methods of training now followed by the Demonstration Parties should continue. As a matter of fact, it may be necessary to increase the number of such parties as new lines of industries on a cottage basis with good chances of success are explored. In the interest of the cottage industries whose importance in the economic structure of the province as providing the means of livelihood to several millions of the rural population can hardly be over-estimated, efficient Demonstration Parties as a system of training in improved methods not only for enabling the cottage workers to hold their own against competition of factory made goods but also for expanding their markets should be organized on suitable lines. We have indicated above the drawbacks and difficulties of the existing demonstration parties. Since in organizing demonstration parties on new lines in future, the same mistakes are to be avoided, we feel that we may usefully refer to the main recommendations (as contained in Chapter IV) of the Technical Education Sub-Committee regarding the reforms that are to be carried out in the form and contents of training imparted by the existing demonstration parties as well as in their organization, for these suggestions are expected to provide a good guidance as to the working methods of demonstration parties as institutions for imparting efficient training to cottage workers. A resume of the main recommendations of the Sub-Committee is furnished in Appendix IX.

**216. Cottage-cum-factory training for cottage workers.**—Since the demonstration parties are going to fulfil an increasingly important role in training cottage workers and also the cottage workers should learn to their own advantage how to carry on commercial production, the need for organizing training in such wise that the learners may have the advantage of knowing methods of production under commercial conditions require to be emphasised. As the review of the working of the demonstration parties reveals, one serious drawback was the absence of training under commercial conditions. To give a concrete instance of how cottage-cum-factory training for cottage workers can be usefully organized, we may quote from the Interim Report of the Technical Education Sub-Committee, the following observations.—

“As the success of the training given by the Pottery and Coir Demonstration Parties would according to the scheme envisaged by them be conditioned by the establishment of factories to which such Parties should be attached, Government should simultaneously initiate measures such as should induce private enterprise to start more of such factories in the interest of cottage workers in different parts of the Province. The success of a few pioneer enterprises in these lines such as have been launched at Srimiketan and Uluberia will no doubt be an inducement by itself. But as none of these may be regarded to have passed the experimental stage and firmly established itself on a profit-earning basis, they should be given special consideration in the matter of all reasonable measures of assistance as they may seek of Government. In regard to the coir factory at Uluberia in particular, which does not receive any grants from Government but which according to the evidence of the proprietor of the concern appears to be handicapped by the inadequacy of its capital resources, the Sub-Committee recommends the grant of financial assistance by Government for a limited period provided the factory is agreeable to give facilities for the training of a specified number of persons, say five or ten, nominated by the Department of Industries. The wages offered by the factory to the producers of husks and coir should in such event be regulated by Government in a manner that will protect the legitimate interests of both the factory and its workers. The necessity of such training will arise in connection with those who may intend to start similar factories in other parts of Bengal offering very good chances of success for the development of the industry, such as at Noakhali and Barisal. The Sub-Committee are of opinion that the activities of the Coir Demonstration Parties should for some time be confined to the factory zone



at Uluberia where alone their services can be effective in the present conditions. The Sub-Committee are advised by the Superintendent, Textile Demonstrations, that this zone along with the factory can be effectively served by one Demonstration Party. When the commercial possibilities of this factory are fully demonstrated and potential entrepreneurs trained in this factory show a readiness to start similar enterprises in other promising areas, the number of Demonstration Parties may be increased with a view to rendering identical services.

At present in Noakhali, Barisal and such other places where cocoanut plants have an abundant growth, the husks are practically thrown away. The development of the coir industry in these places would offer a very profitable outlet for the commercial utilization of the wasted raw materials, and this would not only open up a new source of income to the rural population of these areas, either as suppliers of the raw materials or as cottage workers, but also, augment the industrial wealth of the Province. The coir industry in Bengal would thus appear to have excellent economic potentialities. As, however, the development of this industry is conditioned by the establishment of factories like the one working at Uluberia, the Sub-Committee strongly urge that Government should actively assist the organization of similar factories in other suitable areas of the Province."

217. **The scheme presupposes gradual growth of a link-up system of industries.**—From the above, it will be evident that training when combined with factory practices becomes more useful. Apart from its training aspect, the scheme presupposes a slow growth of a link-up system of cottage and large scale industries such as prevails in Japan. That one or more of the industrial processes for the manufacture of an industrial finished good under the auspices of a large factory may be taken up by cottage workers under proper guidance and supervision has been demonstrated by the industrial system of Japan. Since we are visualising a stage of industrial development in this country when the cottage industries will be made more efficient through suitable training and organization, we should have in view the possibilities of evolving some sort of a link-up system of industrial development here also. In that context, the question of cottage-cum-factory training of cottage artisans becomes really important.

## CHAPTER XVII.

### Technical Education and Women.

218. Since the role of women in the economic sphere is steadily growing into a factor of increasing importance for social progress, we have thought it desirable to examine the question of technical and industrial education for women in Bengal. We cannot ignore to-day the fact that already the problem of finding gainful occupations for literate and uneducated women has assumed a proportion which deserves the serious consideration of all who seek to promote the economic welfare of the country. The education of girls was till recent times limited to general schools and colleges and the pursuit of any technical lines was hardly considered necessary. But with the changing conditions in the country and the economic problems becoming more and more serious day by day, the problem of a career has become a serious question with girls. This is a logical consequence of social progress in every advancing country and need not be considered as a special problem in India. That a well-planned system of technical education imparts not only practical training in many trades, but also a standard of culture which is the gift of modern civilization, has been recognized all over the world. We should recognize this fact and plan our system of technical education in a manner that it can afford proper facilities of training for girls in order to enable them to gain an economic footing for themselves and to march abreast of modern social progress.

**219. Special needs of Women.**—In spite of the fact that women may claim to march shoulder to shoulder with men, here in this country a wide-line of demarcation between the scope of work for men and that for women much necessarily remain, although the present war has shown how women can render very useful and necessary services even in connection with the prosecution of the war. Having regard to social conditions in this country, we feel, therefore, that we cannot suggest that the institutions as planned for boys will be equally good for girls and that these will serve their needs satisfactorily. For instance, while women may become good doctors, they will make poor mechanical engineers. In any case girls need not go in for an engineering degree although they may make good textile experts, modellers, artists, sculptors, steno-typists and the like. It is in view of these considerations that we should regard the requirements of girls' technical education more or less in a special light.

**220. Different grades of education necessary.**—As in the case of boys, the technical and industrial education of girls should also be of different grades according as (i) the girls are uneducated, and (ii) literate. Among the uneducated girls and women, there are found many hundreds of widows and helpless cast-aways from the society who are in need of an economic footing. Their problem constitutes a serious question which is being partly dealt with by the various Homes and Women's Industrial Schools in different parts of the Province. Such institutions as the Saroj Nalini Dutta Memorial School, the Dum Dum Women's Co-operative Home, etc., have their proto-types in almost every District and combine in them both general education and some forms of technical education such as embroidery, weaving, tailoring, etc. Since most of these schools have been organized mainly as philanthropic or humanitarian institutions, the industrial training does not always receive the necessary emphasis. For all that the social utility of such institutions is indeed great and it would be wrong to minimize their importance. In our scheme of technical and industrial education, these schools also should find a place. Although the equipments and organization of many of these schools are defective and poor, we may consider them as trade classes on specific lines. We, therefore, suggest that in order to make these institutions more well-equipped and serviceable to girls and women, efforts ought to be made to reorganise these industrial schools as artisan classes. If this reform in their organization and contents of training is carried out, the training of girls and women will become more efficient and useful to the trainees concerned. There are again certain special schools in Bengal organized on a commercial basis, such as the Home Industries Association, Good Companions and the Kalimpong Arts and Crafts School. These institutions were started with a missionary objective and although they have been reorganized so as to impart vocational education to the boys and girls of Christian faith, they run the production side strictly on a commercial basis. As such these organizations also may be treated as trade schools in so far as our scheme of technical education for Bengal is concerned.

**221. Training for educated girls.**—Since in recent times an increasing number of girls have come up for technical education, we feel that in certain Technical High Schools, Women Sections may be opened in accordance with local requirements and convenience. Girls' sections may also be required by some of the District Weaving Schools. The courses and curricula should be the same for girls; only advanced knitting and sewing courses may have to be added to the general programme of studies in those sections.

**222. Need for regional trade schools.**—As we have urged in Chapter XVI which deals with the training of cottage workers, systematic efforts should be made to develop trade schools for girls and women in areas where there exist favourable conditions for organizing such schools in specific industrial lines. For instance, in Howrah or Noakhali trade classes in coir weaving may usefully be developed and if demonstration factories can be

set up or exist in the locality, useful practical training can be imparted to girls and women. What would be of the best advantage to girls and women is a training cottage-cum-factory units as explained in Chapter XVI. The same type of training can also be provided for in the case of other industries like weaving, soap making, hat making, etc

223. **Higher technical studies.**—As for training of girls, in higher technical subjects, we do not feel that it is necessary or desirable to start a Ladies' Section in the proposed Polytechnic, Administrative costs and difficulties would forbid such an arrangement. As in the case of medical schools and colleges, girls receive training along with boys, in the senior technical institutions, girls desirous of pursuing technical lines may also be co-educated along with boy students. For purpose of improving the efficiency and enlarging the outlook of the average housewife, particularly among the poorer classes, by providing her with facilities for instruction in domestic subjects, hygiene, mother crafts, sick nursing, etc, separate institutions may be established. The need for such institutions is indeed called for by the prevailing poor state of public health and high infant mortality in Bengal.

## CHAPTER XVIII.

### Apprenticeship Training and Vocational Guidance.

224 In every industrially advanced country the need for arranging practical training for students in factories or under commercial conditions who have had a course of theoretical technical training in some institutions or other, has been recognized for the reason that unless students have the opportunity of testing their theoretical knowledge by actual operations in industrial processes, their training cannot be of any practical use to them. Practical training is sometimes arranged in workshops attached to technical institutions, but since it is not always possible or within the means of industrial institutions to organize adequately equipped workshops, a system of apprenticeship training is evolved under which industrial firms receive selected students for extending to them facilities of practical training in their different sections, subject to agreed conditions. There is also a great advantage accruing to themselves for, thereby they can recruit necessary technical personnel on whose efficiency they can depend. A system of apprenticeship training should thus form a necessary and useful part of every system of technical and industrial education.

225. **Implications of the system.**—A system of apprenticeship training necessarily involves (i) the co-operation of different industries, and (ii) the establishment of an organization under whose auspices the selection of apprentice students is to be carried out. Such an organization must enjoy confidence among the industries and should be in a position to influence the training methods in the various technical institutions which are the potential sources of all apprentices. Besides, there should be suitable methods of testing apprentices so that they may be directed to those industrial lines for which they possess special aptitudes and training.

226 **The working of the existing system.**—We have already described the existing system of apprenticeship training in paragraphs 59-61 above. In working, this system has not been very successful as will be evident from the limited results achieved so far. The general features of the system may be summed up as follows:—

(a) So far only 20 industrial firms including, three Railway (Bengal and Assam Railway and Bengal-Nagpur Railway) workshops have been co-operating with the Board of Apprenticeship Training. This shows that the scheme has not succeeded in enlisting the collaboration of a very large number of industrial firms.

(b) Whatever support has so far been received is mainly due to the personal influence of the Heads of institutions. The Principal of Calcutta Technical School offers the following remarks in this connection:—

“The Board did not concern itself directly with the matter of getting boys apprenticed to any firms. The responsibility in this regard devolved entirely on the heads of technical institutions.”

(c) In respect of the number of trainees who receive facilities of apprenticeship practice and also the type of training they receive in technical institutions, general impressions are not very complimentary. In response to a special questionnaire regarding the present system and its re-organization along desirable lines, many firms offered various criticisms. Here a few of their observations are quoted:—

“Training under the existing system seems to be insufficient in comparison with the requirements of the area at the present time”

“Many boys cannot avail of the opportunity of going through these schools, just because they cannot procure permission from suitable workshops for practical training. The Board ought to come forward to help the students to get such opportunity.”

“One part of the existing scheme needs over-hauling, e.g., all applicants for apprenticeship through our office are to produce evidence of having passed the Board of Apprenticeship Examination and we will not take any one who has not passed this examination; on the other hand the Technical School Authorities will not take boys for theoretical training unless they are employed in a local workshop, thus a deadlock exists.”

“The standard of technical training of the average youth who has been trained under the Board of Apprenticeship system is not good enough to prepare him for higher grade posts such as Head Foremen, Designing and Installation Engineer.”

**227 Drawbacks of the system.**—From the above remarks, it will be evident that the existing system has had very limited results and suffers from several drawbacks. In 1928 a Sub-Committee of the Board of Control for Apprenticeship Training examined the scope and functions of the Board and found out some important reasons for the failure of the Board. These reasons have been quoted in paragraph 44 above. In view of these drawbacks the Sub-Committee made a number of suggestions for making the Board a more representative body and for investing it with large executive and financial powers. But very little was done by way of implementing these suggestions with the result that the working of the Board has not been a success, for practically the same drawbacks as mentioned in paragraph 44 still exist.

**228 Efforts for organizing an independent system of apprenticeship training.**—About 4 years back the Employment Adviser to the Government of Bengal tried to evolve an independent system of apprenticeship training and he gives a summary of the results that attended his efforts in these words:—

“The scheme is based on my survey of the existing state of employment in the various industries and trades in Bengal, summarised in the recent publication of this office, *New Avenues of Employment for Bengali Youths*.

After this survey had been completed, I was permitted by Government to enter into direct negotiations with mills, factories, and firms doing business in Bengal with a view to securing better facilities for the training and employment of Bengali youths. I have started negotiations with every important firm in Bengal and am trying to induce them to offer a few apprenticeships to such Bengali youngmen possessing the requisite qualifications (Hindus as well as Muslims) as may be recommended by this office.

We are still in the state of negotiations, but a few firms have already taken in, or agreed to take in, men registered in our office. So far, we have put in 2<sup>4</sup> men in a gas factory, 2 in a biscuit factory, 6 in a paint factory and 1 in a cotton mill."

Evidently the efforts of the Employment Adviser have been more or less abortive inasmuch as the scheme as outlined has not been pursued and stands now practically suspended.

**229 Two questions to be considered.**—It will be clear from the scheme which the Employment Adviser sought to initiate that it embraces (1) students from general schools and colleges, and (2) students passing out of technical and industrial institutions. It is to be considered whether the apprenticeship training which we envisage in our scheme of technical training should cover both general students and technical students or only the latter. Although we are concerned with students from technical institutions mainly, we need not exclude from the scope of our scheme the question of placing young boys with general education in business and commercial firms. This aspect of the question should properly be discussed in connection with commercial education which we propose to keep outside our scope of enquiry for the present. Yet for our present consideration, we envisage a scheme of apprenticeship training which should cover the following categories of apprentices.—

I *Student Apprentices.*—These apprentices while studying in technical institutions as regular students will undergo practical workshop practice in industrial firms under arrangements and conditions specially agreed upon between the Board of Technical Education and the firms concerned.

II. *Trade Apprentices*—These apprentices are regular employees in various firms and receive theoretical instructions in the evening or day classes of specified technical institutions in accordance with a prescribed course of studies.

III *Other Apprentices*—Other apprentices are B Sc. or M Sc students coming out of this University or students passing out of the various Technical Institutes such as Serampore Textile Institute, Tanning Institute, etc.

**230. General outlines of the scheme.**—Since we have already recommended in Chapter VIII that the present Board of Control for Apprenticeship Training should be replaced, we may straight way lay down the general outlines of a new scheme that will suit our requirements better:—

(a) Under the auspices of the proposed Board of Technical and Industrial Education, there will be an Employment Bureau which will deal with the problem of apprenticeship training.

(b) A Sub-Committee of the Board will supervise and guide the functioning of the Bureau.

(c) The Bureau will maintain a constant touch with industrial firms and a register of the requirements of those firms will be maintained so as to direct suitable apprentices to where they are needed.

(d) Test examinations suited for different grades of students will be annually held under the auspices of the Bureau and the courses of studies, etc., for those examinations will be determined by that Sub-Committee.

(e) One or two Welfare Officers will be appointed under the Board to watch and supervise the work and progress of all apprentices. Such a machinery should be set up in consultation with the co-operating firms, so that there may not be any misunderstanding as to the functions of such officers. The advantage of this arrangement is likely to be that while the apprentices may receive proper treatment and training in the factories, they will also feel encouraged by the fact that their progress is being watched. Such watching is also called for by the experience which apprentices, now-a-days receive in the factories which treat them generally as mere charity

boys, as if they have been thrust upon them. The status and dignity of the apprentices must be raised. It should be impressed on the industrial firms that by participating in this system they are not bestowing a favour on the apprentices, but they themselves stand to be benefited by regular supply of trained personnel. Under the existing arrangements recruitment is made mainly through the employees or through advertisement but such recruitments are bound to turn out unsatisfactory in majority of cases, for unless a reliable and expert body selects through proper tests, really efficient hands cannot be expected.

(f) Further, the Government should offer to the industrial firms certain inducements in lieu of which the firms will undertake to receive a certain number of apprentices in their firms. The inducements which are generally in vogue and are apt to be welcomed by industrial firms are as follows—

(i) Government patronage in the shape of purchase of Government stores from industrial firms operating in Bengal. Since the purchases by Government for departmental purposes constitute a large volume of goods, it is generally believed that if the bulk of such goods is purchased from local firms, they may be willing to extend to our boys facilities of apprenticeship training. About four years back the question of the volume of materials that the different departments of Bengal Government may purchase from Indian and specially Bengali firms was considered in connection with a scheme for the establishment of a Store purchase organization in Bengal. The examination of the question revealed that of Bengal's total purchases worth about Rs 37 lakhs from within India, the following items are important:—

	Rs
Stationery articles	9,39,000
Clothing requirements	6,71,000
Surgical and Medical requirements	4,61,000
Arms and accoutrements	1,21,000
Raw materials for jail manufacture	6,65,000
Tools and plants	1,17,000

There is no reason why a large portion of these materials cannot be purchased from Bengali sources. If the accepted principle of granting a preference up to 5 per cent. to Bengal products in price, qualities remaining the same, is applied as a general rule, there seems to be a large scope for inducing industrial firms to co-operate in any scheme of apprenticeship training.

(ii) Facilities for the acquisition of lands for industrial purposes under the Land Acquisition Act. Such facilities are often sought by industrial firms and the Department of Industries has followed a definite policy to assist industrial firms in such matters. A limited number of firms who gained such facilities agreed to communicate their annual requirements to the department for apprentices and to receive suitable candidates nominated by the Department. On some occasions the understanding was honoured, but gradually the few firms stopped communicating their requirements and the Department also failed to systematise the arrangement as a definite annual programme. Although the arrangement is more or less dead, it shows all the same that if the firms are carefully handled, a regular understanding may be reached. This inducement has, however, a limitation that it cannot be extended to one and every firm for the reason that every firm is not likely to require the acquisition of lands.

(iii) Another possible way of extending the scheme of apprenticeship training may be provided by industrial ventures in which Government has contributed some share capital in pursuance with the principle of encouraging pioneer industries or industries which are of special national importance.

(iv) There is also some scope under the State-Aid to Industries Act to assist a scheme of apprenticeship training. All industrial firms which receive loans under the Act may be required to co-operate in the scheme.

Uptil now the operation of the scheme has not been in any wide scale with the result that its operation has remained limited to cottage and small industries only. The provisions of the Act enforce such rigid terms that it is not possible for all industries to take advantage of the Act. We understand that the Bengal Industrial Survey Committee recognized its limitations and recommended its modification on certain desirable lines. If the reforms as suggested by that Committee are, we are told, carried out, it is expected that the Act will be more widely taken advantage of by both large scale and small scale industries. In that case it will be possible to strengthen our scheme of apprenticeship training by enforcing on loanees a condition that they will receive apprentices selected by the appropriate Sub-Committee of the Board.

If a general notification is issued by Government inviting industrial firms to co-operate in our scheme of apprenticeship and indicating the forms of assistance which Government will consider in respect of co-operating firms, a good and favourable response may be forthcoming.

**231. Systems of Apprenticeship Training.**—There are three systems of apprenticeship training generally followed. A brief reference to their respective spheres may be made here:—

(a) The system under which both theoretical and practical training are given simultaneously. This is the oldest system introduced in England not by the Department of Education but by the Admiralty in Great Britain as a measure of practical necessity entailed by the ship-building industry. It has since been copied by Japan, Turkey, America and a host of other countries.

(b) *Sandwich system.*—Under which theoretical and practical training are given alternately after specified periods devoted to each form of training. It now exists in a few places in U.K. but is practically dead. It is difficult to fit in such a system with the prevailing organisation of industries, for a batch of men pushed in and taken out of factories from time to time for the purpose of giving practical training has a great dislocating effect.

(c) The system under which a full course of theoretical training is followed by a short period of practical training. Such a system may be practically feasible but it suffers from certain obvious drawbacks. The average man moving in an academic atmosphere up to the advance age of 21 years or so cannot as a rule adopt himself to the peculiar needs and discipline of factory life. Besides, there is no correlation between the theoretical training received by boys under this system and the peculiar organisation of industries in which they may have to seek employment.

Since the simultaneous system is the best, it should be followed in planning the programme of apprenticeship training in different workshops and in technical institutions, as far as possible.

**232 Expected response from Industries.**—In view of the fact that by co-operating in a suitable scheme of apprenticeship training, the employers themselves are likely to be benefited, it is expected that the support from the industries will be quite satisfactory. At the initial stage the number of co-operating firms may not be quite large but we feel that we may be confident in the ultimate success of the scheme. This inference is supported by the replies received to our special questionnaire, for many firms have promised support to any good scheme that may be evolved. A resumé of the replies is furnished in Appendix VIII. Even though the indications of response seem to be encouraging, the Board is to watch the working of the system and consider in the light of experience, if there is need for any legislative measure at any stage for enforcing the system of apprenticeship training among the industrialists.

**233. Need for a Psychological Laboratory to be attached to the Employment Bureau.**—Since technical education should include also suitable adjustment of workers to the different occupations, it is desirable that

there should be organized some means of testing the intelligence, efficiency and capabilities of different types of workers at different stages so that they may receive appropriate vocational guidance in their journey of life. For this purpose, we consider that a Psychological Laboratory should be started as an appendage to the Employment Bureau, under the guidance of trained educationist Psychologist with an adequate staff of psychological assistants. In course of time this nucleus may grow into an Institute of Industrial Psychology for devising and administering Psychological tests, but for the present a Psychological Bureau with a small Psychological laboratory is considered necessary in view of the following important considerations:—

- (a) the growing mechanization of industrial processes is rapidly invading business and professional occupations, and affecting the manner in which work is to be done;
- (b) the effects of new inventions and discoveries on established occupations and on the development of new occupations are to be taken into account in all educational plans;
- (c) the demand for skilled labour in the occupations for which the industrial and technical educational institutions are offering vocational courses, is to be studied, so as to guard against overcrowding occupations for which a full supply of workers is available;
- (d) for purposes of vocational guidance knowledge of both the past and present experience and accomplishments of an individual is necessary and to this end accumulative reports which provide a running record of an individual's progress through school and into industrial or higher educational institutions should be installed in every school system, which attempts a vocational guidance programme. It is felt that such records not only have value in the guidance of the student, but are of great assistance to the teachers or other supervisors in their dealings with the students;
- (e) information obtained from the study of the individual should as far as possible be expressed in terms of uniform and objective measures which are understandable when the pupil moves from one educational or industrial institution to another;
- (f) psychological tests as a measure both of mental capacity and educational achievement are one of the most valuable instruments for educational and vocational guidance;
- (g) for assistance in giving vocational guidance, there is need for the development of objective tests of personality characteristics;
- (h) occupational studies are a necessary tool of vocational guidance. They serve to give information to young people regarding the duties, conditions of work, and the preparation necessary for the occupations which they eventually may enter and to provide a background of adequate industrial knowledge for teachers of occupations, and all others who serve in an advisory capacity;
- (i) occupational studies should be general in so far as the information is applicable to conditions in Bengal, and specific in regard to the local community where, presumably the majority of young workers will find an occupation. Occupational research should be made a part of every vocational guidance programme; and
- (j) try-out courses in occupational samplings are needed for the discovery of ability and interest leading to choice of vocation and vocational preparation. These courses should provide for each pupil the opportunity to explore elementary exercises in the tools, materials, and processes of agriculture, industry and business, and contacts with professional callings should be provided.

We do not propose at this stage to suggest the detailed organization or functions of the Psychological Bureau as outlined above but leave its details to be worked out by the Board.



## CHAPTER XIX.

## Control of Technical Education.\*

234. In the foregoing chapters we have described the existing facilities of technical and industrial education in Bengal, the drawbacks and deficiencies from which they suffer and also the desirable reforms which are called for in order to improve the system on appropriate lines. The important question which now remains to be considered in all its aspects is that of the control and development of such education. While suitable reforms are essential to enhance the efficiency of the existing system and attune it to the progressive needs of the province, the problem of organizing an efficient control of the system is also vitally important, for the reason that unless the system receives a well-considered direction in its functions from a competent body, it cannot be expected to achieve the results for which it is intended. While describing the existing arrangements for technical and industrial education in Bengal, we found that there exists no unified or co-ordinated control over the system. It is shared by the Department of Industries and the Department of Education, not on the basis of any well-planned and well-considered division of responsibility but merely as an arrangement of administrative expediency. That it is not satisfactory from the viewpoint of efficiency and the progress of technical education has been recognized by different committees and experts. Since our object is to suggest a self-contained system of technical and industrial education, we should necessarily consider the question of control and resolve it on a satisfactory basis since it has already given rise to controversial views on the subject.

235. Since the report of the Indian Industrial Commission (1916-18), the question of control of technical education has been in the fore of discussion and opinions have differed as to whether it should be placed under the Department of Education or the Department of Industries or an independent Board. As the discussions and considerations relating to this problem have been many and voluminous, a short account of these is furnished in Appendix VII, which is likely to be interesting as well as illuminating for the purpose of reaching a helpful conclusion on the subject.

236. We do not propose to deal with the different proposals and examine their respective merits or demerits. The view-points urged therein have their importance in so far as they clearly reveal the shortcomings of the existing arrangements. Three specific issues emerge out of the past enquiries, reviews or departmental discussions, namely.—

- (i) whether the entire system of technical education should be placed under the Department of Education; or
- (ii) whether it should be exclusively placed under the charge of the Department of Industries; or
- (iii) whether the entire system should be placed under a third organization, i.e., an independent body.

In examining these questions, we should keep in mind findings at which we have arrived in the foregoing chapters and try to ascertain what sort of an agency should be preferred for the purpose of control of technical education in Bengal.

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\*Mr S. C. Mitter wants it to be recorded that in principle he does not agree with the Committee in recommending that the control of technical and industrial education should be vested in a Board of Control apart from the Department of Industries. In his view such control, if exercised by an independent Board, will not ensure better efficiency or more progressive development of technical education in Bengal, unless the proposed Board is exclusively manned by industrialists and technical people.

\*Dr. Pandya also wishes it to be recorded that he does not entirely agree to the proposals contained in this Chapter.

237. **Functions of the Board.**—We have found in the course of examining the present position and future reorganization of the various institutions which now exist and the establishment of institutions which are to be organized in new directions, that the control should be vested in a body which is competent enough not only to plan but also to execute the various reforms suggested in the foregoing chapters. We have found that the needs of suitable technical and industrial education are very urgent and have an essential bearing on the future economic progress of the province. We are, therefore, emphatically of opinion that unless the task of implementing the various proposals contained in this report is pushed on with vigour and a constructive imagination, no useful results can possibly be achieved. Briefly speaking, whatever body may be chosen for planning, developing and controlling technical education in Bengal, will be called upon to execute, among other things, the following functions:—

- (1) to undertake a periodical survey of the educational needs of the industries of Bengal, both present and potential, through the agency of the Inspectors to be appointed under the Board;
- (2) to prescribe the courses of studies and regulate the standards of instructions for the various stages (*vide* Chapter VI) at various industrial and technical institutions in the province;
- (3) to arrange for the periodical inspection of industrial and technical schools and institutions in the province;
- (4) to institute examinations and make arrangements for holding them;
- (5) to formulate specific financial proposals for maintaining and developing technical and industrial education in the province;
- (6) to make grants-in-aid to the schools and institutions under its control;
- (7) to determine the conditions under which new schools and classes shall be established by the aid of Government;
- (8) to prescribe suitable text-books and to arrange for the translation into vernacular of text-books on technical subjects;
- (9) to introduce a comprehensive system of apprenticeship training (*vide* Chapter XVIII) for different categories of trainees by negotiations with the industrial firms and other bodies; and
- (10) to promote industrial researches at laboratories attached to the various technical institutes, colleges and universities by (i) distribution of funds, and (ii) distribution of appropriate research subjects.

A brief analysis of the implications of these functions would indicate that the administration and control of technical and industrial education would involve considerable responsibility and constructive initiative, if we want to reorient the system of technical education in Bengal with a real purpose to make it efficient and comprehensive in its scope and contents. Let us, therefore, examine the existing arrangements, with reference to the important developmental functions to be discharged by a controlling body, in order to ascertain how far they are adequate to meet the requirements of the system we envisage.

238. **Should Education Department control Technical Education?**—We are aware that technical and general education have this in common that up to a certain stage, the two forms of education should be imparted through a common course of studies until a stage for the selection of different courses for different boys of varying aptitudes is reached. As we have already urged, technical education can hardly be distinguishable from general education, for the basic purpose of education in both cases is the same. Yet there are and should be organizational differences between the two forms of education and also differences in the contents of curricula. We are, therefore, envisaging a system of technical education which will involve a separate organization, but will be so adjusted with the prevailing system of

general education that quite wholesome results may be achieved thereby. The considerations which have induced us to conclude that the control of technical education should not be placed exclusively under the Department of General Education may be summed up as follows:—

(a) The Department of General Education does not possess the requisite experience and the requisite technical staff to supervise and develop industrial and technical institutions to the best advantage. As already stated, a number of institutions are controlled by this Department, but we are not aware if any constructive efforts have been made to organize technical education on progressive lines

(b) Mr. Abbott suggested in his report that ultimately technical education should be placed under the Department of Education, assuming that industries would by that time be so developed in the country that they would know their requirements and place their needs before the Education Department for appropriate measures. We feel that this assumption cannot be made at the existing stage of our economic progress. In England the state of progress already achieved is such that the guardians themselves are in a position to calculate the chances of their wards more or less accurately and industries are adequately organised to assess their needs and requirements of technical personnel. In this country, however, such a stage is yet to arrive. When that stage comes, technical education may pass under the supervision of the same authority which controls general education as suggested by Mr. Abbott

(c) Since general education is relatively more developed, although it requires reorganization in certain directions, and its needs have been thoroughly assessed and known, it may be generally apprehended that if technical education is controlled by the Department of Education, its cause is likely to suffer. Also if a unitary body is set up to control both the types of education, the interests of technical education may be neglected or sacrificed in favour of general education. This apprehension is strengthened by the traditional bias towards general education which still lingers in the minds of the public.

239. **Department of Industries not in a position to assume the entire responsibility.**—If in view of the above considerations the Department of Education is not the suitable agency to exercise exclusive control over technical education, the Department of Industries, although better equipped and controlling the major part of technical education in the Province at the present moment, is not probably in a position to assume the entire responsibility. In the first place, the department is not fully equipped to usefully supervise all branches of technical education as it now prevails. The department has not viewed and understood technical education in its widest bearings as envisaged in this report and was never called upon to treat technical education in all its aspects. For instance, it cannot efficiently tackle the various educational problems such as psychology of the child, growing needs of the adult, etc., which face the Department of General Education. Further as the exclusive control of the Department of Industries over technical education cannot embrace the entire field, it is likely to lead to conflicts with the Department of Education. While admitting that the Industries Department is better fitted to maintain a constant and growing contact with industry and trade, we are inclined to feel that an outside body in which both the Departments are well represented will be in a better position to stimulate a healthier and more harmonious relationship among all parties concerned.

240 **A Body representative of all interests necessary.**—Necessarily any body that may be set up for the control of technical education should contain adequate representation of Education Department as well as the Department of Industries, and also contain educational experts, University representatives and representatives of industry and of the Legislature. Thus it is expected that under the auspices of such a Body, it will be possible

to develop the technical and industrial education of the Province on harmonious and progressive lines. We propose that such a body may be named the Board of Technical and Industrial Education, Bengal. On the desirability of such a Board, we have had discussions with various educational experts in this province as well as in other provinces and the conclusion has been borne upon us that the present system of duality in the control of technical education in the province is very unsatisfactory and does not ensure either efficiency or expedition. Thus the proposal for a Board as suggested below has behind it a body of substantial support.

**241. Character of the Board.**—From the unhappy experiences of advisory Committees, we are of opinion that the proposed Board should be invested with adequate powers so as to be in a position to discharge its functions with the maximum efficiency. The Sub-Committee of the Board of Control for Apprenticeship Training while reporting on the reorganization of the Board made the following suggestions:—

“The Board should be entrusted by the Government of Bengal with a large measure of responsibility for industrial training, education and development. Consequently, it should be given large financial powers; it should have submitted to it and should accept, reject or modify, the annual budgets of all institutions subordinate to it; and it should receive substantial grants from Government for the financing of development schemes submitted to it by these institutions and receiving its approval”

Following the same considerations, we, therefore, recommend that the Board of Technical and Industrial Education which we are going to propose (i) should be a Statutory Body, (ii) should be invested with executive functions, and (iii) should be provided with block grants to be utilized according to Board's requirements and programme, and (iv) should have large financial powers of accepting, rejecting or modifying the annual budget of technical institutions. The predominant consideration which induces us to suggest such a body is that unless such powers and functions are vested in it, its working will not ensure an efficient and constructive handling of the urgent problems of technical education which are awaiting solution. Such a machinery will minimize the delay in dealing with problems and schemes of Bengal's technical and industrial education. The dilatory manner which is the result of official redtapism in Government Departments has been much criticised in all quarters. Our attention has in this connection been drawn to one instance which may be mentioned here. About a few years back the Calcutta Technical School sponsored a master printer's course of training and it received the support of a large number of local firms who were ready to contribute substantial financial assistance for the promotion of the Scheme. But the Government took too long a time to decide, and by the time their decision was reached, the supporters of the scheme withdrew their support and were not in a position to participate in the Scheme. Such unfortunate delays are expected to be minimized by the working of the Board which we are going to suggest. Further since the Board will deal exclusively with technical education, it will be in a better position to sponsor and initiate developmental reforms more readily and expeditiously in respect of technical education in the Province.

**242. Constitution of the Board.**—Since we consider it essential that the Board should command the confidence of the public, combining in its composition, technical talents, administrative efficiency and representative interests, we recommend the personnel of the Board as follows:—

- (1) The Hon'ble Minister for Education, *Chairman (ex-officio)*.
- (2) *Vice-Chairman*—He should be a whole-time salaried person to be appointed by the Government. He should possess high qualifications in Science and Technology and considerable administrative experience.

*Members.*

- (3) Director of Public Instruction (*ex-officio*).
- (4) Director of Industries, Bengal (*ex-officio*).
- (5) One non-official educationist to be nominated by Government.
- (6) One Industrialist to be nominated by Government.
- (7) One Representative of the Legislature to be nominated by Government.
- (8) and (9) Two Representatives of the Universities of Calcutta and Dacca (one each).

The Vice-Chairman will be the executive head of the Board and will be responsible for its smooth and efficient functioning. In order to secure the services of a really capable men, his salary should not be less than Rs 2,000 per month.

243. **Board to function through standing Advisory Committees.**—In order to facilitate the proper functioning of the Board and to ensure the collaboration of outside experts and industrialists in specific lines, there should be set up a number of Advisory Standing Committees for specific groups of industries such as Textiles, Engineering, Cottage industries, etc. These Sub-Committees should include representatives from the allied industries so that a close association may be established between educational policies and the industries concerned. Besides, there should also be a Research Sub-Committee to promote industrial researches in the laboratories and a Finance Sub-Committee to look after and control the finances of the Board. The Board will decide the number of Advisory Committees to be set up to discharge its responsibilities.

244. **Staff for the Board.**—It is hardly necessary to emphasise the need for a self-sufficient and capable staff organization to be set up for the Board. Since the Board has to assume the entire responsibility of supervising and controlling and developing technical education within the Province, it is essential that the staff to be placed under its disposal should be not only efficient but also adequate for their purposes. Having this consideration in view, we recommend the undernoted staff. The ultimate strength of the staff will be determined by the Board in the light of experience and requirements—

**A. Inspectorate—**

- (1) One Chief Inspector of Industrial and Technical Institutions

Since large responsibilities will devolve on this Officer on whose initiative and efficiency will largely depend the progress of technical and industrial education of the Province, he should be given a special grade of pay, viz, Rs. 1,000—1,500. He should be the Secretary of the Board in an *ex-officio* capacity.

- (2) Five Divisional Inspectors for the five administrative Divisions of Bengal. They should be in the cadre of B.E.S. (Senior) and have an initial salary of Rs. 500. Their headquarters will be located in the respective Divisions.

**B. Establishment—**

- (1) One Personal Assistant to the Vice-Chairman.
- (2) One Office Superintendent.
- (3) One head Assistant (U. D. Clerk).
- (4) One Accountant (U. D. Clerk).
- (5) Four Lower Division Clerks.
- (6) Two Stenographers.
- (7) Three Typists.

**C. Menials for the Head Office—**

Six peons—one for Vice-Chairman, one for the Chief Inspector and four for the Office.

**D. Divisional Staff for each Division--**

- (1) One Stenographer.
- (2) One Clerk.
- (3) One Typist.
- (4) Two Peons.

**245. Functions of the Divisional Inspectors.**—Since Technical and Industrial Education is still at its formative stage in this country, an onerous responsibility will devolve on the executive staff for stimulating and quickening its growth. From the start, therefore, the Inspectorate will have to undertake a considerable amount of exploratory work so as to assess the needs of different districts and to fulfil those needs in the best possible manner. The functions of the Divisional Inspectors may, therefore, be outlined as follows.—

- (a) to carry out the policy and programme which will be prescribed from time to time by the Board;
- (b) to carry out periodical inspection of the methods of teaching, standard of practical training followed in various technical institutions and their equipments and to suggest lines of improvements and to advise the teaching staff in the organization of teaching and practical training;
- (c) to survey the educational needs of the industries existing and potential in each District in collaboration with officers of the Department of Industries, and to suggest suitable schemes of training to meet those needs adequately;
- (d) to assess the financial needs of the institutions within their respective areas applying for grants-in-aid and to recommend to the Board grant of aids to those institutions; and
- (e) to watch the utilization of grants-in-aid by the recipients.

**246 An Employment Bureau to be attached to the Board.**—Since one of the essential services which this Board is expected to perform will be to introduce a suitable system of apprenticeship training and thereby establish a progressive link between the industries and the technical personnel passing out of the institutions under its control, we consider it necessary that an Employment Bureau should be created as a part and parcel of the Board. The Bureau will keep in constant touch with the business and industry of the Province and serve as the liaison agency between the employers and the would-be employees for the purpose of providing apprentices and ex-students with jobs. Now-a-days hardly any institution maintains records of the after-careers of passed students. This is to be very much regretted. The proposed Bureau may undertake this task of maintaining records of persons employed or persons waiting to be employed either as apprentices or as salaried personnel and thus furnish the necessary facts on the basis of which it will be possible to assess the progress of technical and industrial education of this Province.

**247. The functions of the Employment Bureau.**—Necessarily the functions of the Bureau are indicated as follows:—

- (a) To establish contact with all technical and industrial institutions within the Province and maintain records of all students passing out of them and to advise these students in the light of (i) their school records, (ii) aptitudes and training and (iii) the openings of employment available in the area, as to the occupations which they may seek to enter.
- (b) To establish and maintain contact with employers of technical personnel in respective areas with a view (i) to ascertain what openings are likely to be available and the necessary qualifications for filling them, (ii) to persuade employers to recruit their employees through the Employment Bureau and (iii) to prevent thereby the diversion of young talents to unsuitable occupations, as far as possible;

(c) To place in suitable employment the students who have not already obtained posts for themselves.

(d) To watch the work and progress of all students placed in employment under different firms of institutions.

(e) To evolve and supervise in collaboration with employers regular systems of apprenticeship training in respect of different trades and industries.

(f) To advise the Board on the educational requirements of the various industries, on the basis of the experience gained in its dealings with the employers and employees.

248. **The Board to be set by an executive Order at the first instance.**— Pending necessary legislation being enacted, the Board of Technical and Industrial Education may be established by an executive order of the Government and should be invested with the functions and powers as suggested in paragraph 237 above.

## CHAPTER XX.

### Scope for providing facilities of training for demobilized personnel.

249. Since at the present moment the Central Government as well as Provincial Governments are busy devising plans of absorbing demobilized personnel in gainful occupations, during the post-war period, the question of providing suitable facilities of technical training for such persons is of great importance. We may, therefore, assess the scope which the various schemes of expansion and development recommended in our Report will offer for the purpose. The question strikes as to be of great practical importance in view of the consideration that unless our system of technical education is adequate enough to serve the progressive needs of the Province, it will fail in its basic objectives.

250. Let us, first of all, try to assess the needs of the demobilized personnel and examine in the light of such needs, the scope that will be available under the various schemes we have recommended in the foregoing Chapters. The personnel who will be released from war duties and will require some types of occupations for their livelihood may be grouped under three categories:—

- (a) Technical personnel who have had training of some sort or other suited to their individual lines;
- (b) Semi-skilled personnel who have had acquired some limited technical training in some of the technical institutions or at some of the numerous war training centres; and
- (c) Youths in general with some literacy or not, who were recruited to perform no technical jobs, but only general duties in connection with the war either on the front or behind the front

The persons falling under category (a) may not require further training to enable them to take their place in civil industries, but there may be some among them who will be ambitious enough to receive more intensive and high technical training. For such persons facilities will be available at the Central Polytechnic, the Serampore Textile Institute and the reorganized Kanchrapara Technical Institution and the Wood Working Institute and Trade Classes attached to the various Technical Institutions as recommended by us. The second group may or may not receive any further training. Some of them may be ambitious enough to improve their skill and knowledge by following some advanced courses of technical training. It is in respect of the third group of youths whose number will necessarily be the largest, that facilities of technical training will be required in an extensive scale. Many of them will no doubt return to the villages to take to agricultural pursuits; but there will remain still many thousands who will like to pursue some intelligent occupations not connected with agriculture.

251. **Facilities to be available for semi-skilled men.**—It is a fact that the trained personnel who were hastily turned out by the many war training centres in order to suit the urgent needs of the war may not be quite efficient for peace time technical jobs. Deficiency with regard to intensity and all-roundness is the weak point in many of these trainees. It may, therefore, be necessary for them, at least some of them, to undergo some intensive courses of training so as to acquire further technical efficiency. For such persons the Trade classes and Model factories proposed to be set up as appendage to the Technical High Schools and Technical Intermediate Colleges, the Central Polytechnic and the reorganized Kanchrapara Railway School will offer sufficient facilities of training. They will take to such courses as suit their previous training. As a special case admission qualifications for the various courses may be waived and only a suitable pre-admission test may be prescribed in order to accommodate these persons.

252. **Facilities to be available for the unskilled demobilized men.**—To the unskilled men facilities of training in cotton weaving, jute weaving and spinning, silk weaving, wood working, cutlery, smithy, con weaving, button making, etc., will be available in an expanded scale in the various trade schools, junior technical schools and weaving schools. As indicated in Chapter VI, we have proposed the setting up of trade schools in various Districts according to local availability of raw materials, labour and local demand. So it is assumed that the demobilized persons belonging to different Districts will conveniently receive training in trade schools set up in their respective areas. Thus in Malda District training in silk weaving, cocoon rearing or manufacture of mango-products will be quite appropriate for the people of that area. For such districts as Noakhali, Chittagong, Tippera and Bakarganj from which the largest number of recruits were enlisted, training in jute weaving, jute spinning, con weaving, cotton weaving, button making, motor and cycle repairing, watch repairing, leather work, padlock making, repairing agricultural implements, etc., will be suitable. Provided the various institutions are built up according to the schemes proposed by us, it is expected that a substantial number of the demobilized personnel as well as their wards will be able to receive very useful training, which will stand them in good stead in finding some gainful occupations at the end.

253. It should be the immediate task of the Board, after it is brought into existence, to institute such suitable measures as may be necessary for organizing facilities of training for the demobilized personnel and their wards in different Districts so that they may ultimately be absorbed in gainful occupations.

## CHAPTER XXI.

### Summary of Findings and Recommendations.

#### *Chapter II.—The Historical Background of the existing system of Technical Education.*

1. The progress of technical education is everywhere linked with the evolution of the educational system and the growth of trade and industry. But in India, little was done to ensure the evolution of a suitable system of technical education in the country and *pari passu* the expansion of economic opportunities for the people. (Paragraphs 17-18.)

2. The need for technical education was emphasised by the India Famine Commission for providing diversified means of livelihood. Thereafter discussions by Committees and Conferences regarding the problems of technical education were held from time to time. The Simla Educational Conference of 1901 reviewed the situation and recommended many changes in the methods of higher education so as to



make it more effective and practical. An explanation of the new Government policy with regard to technical education was furnished in Government Resolution of 1904, which announced the system of granting scholarships to selected students in order to enable them to pursue courses of technical education in England and America (*Paragraph 19.*)

3. The Enquiry held by Lieut.-Col. Z. H. Dev Atkinson and Mr. T. Dawson, in 1912, was aimed at finding ways and means for bringing technical institutions into closer touch and more practical relations with the employers of labour in India. The Committee's findings were not very comprehensive and their conclusions were coloured by a difference in the industrial progress of the country and the industrial efficiency of the Indian personnel (*Paragraph 22.*)

4. The Industrial Commission of 1916-18 very carefully went into the existing system of technical education, surveyed its defects and requirements and made certain important recommendations in respect of training technical personnel for different categories of industries. (*Paragraph 26.*)

5. In spite of the several attempts to focus attention on the needs of technical education and promote its spread in the country, the industrial policy of the Government was on the whole halting, being influenced by the doctrine of laissez-faire. Necessarily very limited progress was achieved in technical education (*Paragraph 27*)

6. The beginning of Bengal's Technical Education dates from 1856 when the Engineering College at Fort William, later transferred to Presidency College, was started. By the end of the Nineteenth Century, a number of institutions including the Sibpur Engineering College, Survey School at Dacca, Calcutta School of Art and several Industrial Schools grew up. (*Paragraph 28*)

7. As a result of the Simla Educational Conference, some reforms were carried out in Bengal's system of industrial training, such as improved facilities of training in handloom weaving. By about 1913 certain proposals were discussed regarding the question of setting up a Central Technological Institute by reorganizing the Sibpur Engineering College. But no positive decision was reached. (*Paragraphs 29-33.*)

8. Recent Developments in technical education in Bengal were as follows:—

- (a) *Enquiry by the Saddler Commission* which submitted a valuable report on the reorganization of the Technological Departments of the Calcutta University.
- (b) *Enquiry by the Mukherjee Committee, which emphasised the need for simultaneous theoretical and practical training*—On the basis of this recommendation a suitable technical school was established in Kanchrapara and the Board of Control for Apprenticeship Training was constituted.
- (c) *Enquiry by the Unemployment Committee*—Their most important recommendations were (i) immediate adoption of a comprehensive system of technical education, and (ii) establishment of a Board of Technical Education for the control of the entire system of technical and industrial education in the province. The second recommendation was carried into effect, but in working, it was found wanting. It did not succeed in establishing liaison between the employer and the would-be employee and its scope was restricted. (*Paragraphs 37-44.*)

9. In 1936-37, Messrs A Abbott and S H Wood carried out an enquiry at the instance of the India Government and recommended what institutions should be set up and what allied measures should be adopted for improving vocational or practical training. Although the enquiry was limited to institutions in United Provinces and Delhi, the proposals made by them are of importance to other Provinces. (*Paragraphs 45-47.*)

10. In 1939, Mr. J. Sargent, Educational Commissioner (now Adviser) with the Government of India, came to Bengal and at the request of Bengal Government prepared a Memorandum on Technical Education in which he mainly recommended the establishment of (i) one Central Polytechnic in Calcutta, (ii) Mono-Technical institutions in respect of highly localized industries, and (iii) Technical High Schools (Paragraph 48.)

*Chapter III.—The Existing System of Technical Education in Bengal.*

11. The present organization of vocational education may be classified into "Technical" Institutions and "non-technical" institutions. (Paragraphs 49-51.)

12. Non-technical institutions comprise the Commerce Departments of Universities and Colleges, Government Commercial Institute and various junior commercial institutions for teaching business methods, commercial geography, book keeping, shorthand, typewriting, telegraphy, etc., and also medical institutions. (Paragraphs 52-54)

13. Technical Institutions may be grouped under the following heads:—

A. Institutions of University rank—

- (i) Applied Chemistry and Applied Physics Department of the University.
- (ii) Bengal Engineering College, Sibpur.
- (iii) College of Engineering and Technology, Jadavpur.

B Institutions of non-University rank—

- (i) Senior Technical Schools, e.g. the Calcutta Technical School, Technical Schools at Kanchrapara, Pahartally and Khargpur, Ahsanullah School of Engineering, at Dacca.
- (ii) Junior Technical Schools, e.g., four Technical Schools maintained by the Department of Industries at Pabna, Barisal, Rangpur and Bogra, Bengal Survey School at Bankura and other technical schools maintained by private organizations.
- (iii) Monotechnic institutions such as Government Textile Institute at Serampore, Silk Technological Institute at Berhampore, Bengal Tanning Institute at Pagladanga, District Weaving Schools and other Weaving Schools maintained by private institutions. (Paragraphs 55-79.)

14 Average cost of Technical education per student per year calculated on actual expenditure works out as follows.—

Pabna—Rs. 260; Barisal—Rs. 187; Bogra—Rs. 202; Rangpur—Rs. 228; Lucknow—Rs. 381; Gorakhpur—Rs. 215; Jhansi—289  
(Paragraphs 80-81.)

*Chapter IV.—Technical Education in relation to General Education.*

15. The traditional conception of technical education as an inferior form of education is the result of the fact that at the earlier stages general education at the Universities enabled young men to attain social position and material success. But in course of time, the purport and import of education have undergone wholesome changes. It has been recognized that all education is the development and discipline of faculty by the communication of knowledge and whether the faculty is the eye and hand or the reason and imagination, the process is rigidly termed education. Since Technical education and general education answer to this definition, they have a basic affinity between them. (Paragraphs 82-85.)

16. In fact Technical education is complementary to general education which may be regarded as the genus and technical education as species. Since the role of technical education is to create alertness of mind, breadth

of vision, self-discipline fortitude and a knowledge about man and affairs, equally well as general education, the former cannot be regarded as inferior to the latter (*Paragraphs 86-89.*)

17. Since technical education is a necessary complement of general education and covers a large part of human life in the complex world today, there is need for a proper relationship between technical education and general education (*Paragraph 90.*)

18. The following few reforms in the general education system are called for in order to bring it in to harmony with the proposed system of technical education:—(a) A system of universal compulsory and free education for all boys between 6 to 14; (b) curriculum of studies for this period should contain a practical bias; (c) the curriculum of studies between 11—and 13 in general High Schools and Technical High Schools should be common, (d) the secondary education stage should correspond to existing IX, X and XI classes. (*Paragraph 91.*)

*Chapter V.—Technical Education in relation to trade and industry.*

19. Economic history of every advanced country corroborates the fact that industrial progress is possible only if a supporting system of technical education exists (*Paragraph 92*)

20. While India's existing and potential resources warrant a go-ahead industrialization, the country's man-power is sufficiently capable to master a specialized system of technical education which can alone stimulate industrial progress (*Paragraph 93.*)

21. Notes of caution in the matter of planning technical education in view of the relatively backward stage of industrial development have been struck by many Committees of enquiry, but excessive caution leads to no progress. The existing scarcity of Technical personnel during the present war is the result of a conservative policy pursued in the past: (*Paragraph 94*)

22. While attempts should be made to plan technical education on the basis of the country's needs, we need not make a fetish of it. Survey of needs is essential, but in assessing the requirements, one must take into account not only the present needs but also potential requirements as may be warranted by the development of trade and industry of the country in the years ahead (*Paragraphs 95-99.*)

23. Schemes of technical education should be planned with reference to the different categories of industries and should relate to (i) cottage industries, (ii) small scale industries, (iii) large scale organized industries, (iv) agricultural vocations and (v) commerce and business. (*Paragraph 100.*)

24. Technical education should interlink institutions and industrial factories through schemes of collaboration between the two. In the past such collaboration was inadequate and a good deal of misunderstanding or lack of understanding existed. The present position is no better. (*Paragraphs 101-103*)

25. Various methods of co-operation between business and education have been tried successfully in other countries, such as financial assistance or offers of machinery and equipments from industrial firms as a method of publicity, Advisory Committees, etc. (*Paragraphs 104-105.*)

*Chapter VI—A curriculum of Studies for Technical and Industrial Education in Bengal.*

26. The proposed scheme of Technical and industrial education for Bengal should comprise the following stages.—

*Stage I.*—This will comprise two years, viz, 11+ to 13, corresponding to classes VII and VIII of general High Schools.

*Stage II.*—This will comprise classes IX and X corresponding to ages 14 and 15.

*Stage III.*—This will comprise classes XI and XII corresponding to the Intermediate course under general education.

*Stage IV.*—This stage will comprise the graduate and post-graduate training and researches in technical subjects.

The Committee prefers to recommend a more comprehensive Stage II comprising classes IX, X and XI, which, however, cannot be effected unless the necessary modification of the existing system of general education is carried out.

Institutions covering stages I and II will be named Technical High Schools, while Institutions covering stages I to III will be named Technical Intermediate Colleges (*Paragraphs 106-108*)

#### *Chapter VII.—Junior Technical Schools.*

27. A review of the courses of studies of Junior Technical Schools in Bengal reveals the picture of a system of education which lacks co-ordination and a central purpose. (*Paragraphs 111-12.*)

28. Main defects of the schools are: (a) the industrial training imparted is neither efficient nor adequate, (b) the objectives of training cottage workers or Bhadrolog young men have not been fulfilled; (c) the location of the schools away from industrial centres has been injudicious; and (d) the equipments and teaching staffs are inadequate and unsatisfactory (*Paragraphs 113-14.*)

29. Reforms suggested: (a) There should be unified control of all junior technical schools with regard to syllabus examinations, etc.; (b) the curricula of studies of these schools should be on the lines of that suggested for stages I and II in Technical High Schools; (c) Trade classes with or without demonstration factories should be established as annexes of Technical Schools (*Paragraph 115*)

30. It may not be possible to turn every junior technical school into a Technical High School which involves considerable costs. So a few general High Schools and a few Junior Technical may be selected for such experiments. (*Paragraph 116*)

31. The question whether artisan classes should remain as part of the reorganized Technical Schools or should constitute separate institutions should be solved on the basis of local convenience and requirements. Most of the industrial schools in the province which serve as institutions of philanthropic missions and serve varied educational needs may be organized as trade classes or artisan schools. (*Paragraphs 117-18.*)

#### *Chapter VIII.—Senior Technical Schools.*

32. There are four Senior Technical Schools in Bengal, viz, (1) The Calcutta Technical School; (2) Kanchrapara Technical School; (3) Assam-Bengal Railway Technical School; and (4) Bengal-Nagpur Railway Loco-Apprentices Technical School, Kharagpur. The Board of Control for Apprenticeship Training constitutes the pivot of Technical education imparted by these schools. (*Paragraphs 119-23.*)

33. The Calcutta Technical School offers the following courses: (a) Electrical and mechanical engineering; (b) plumbing and sanitary engineering; (c) the electric supervisors' course. The School does not follow definite principles in the matter of admissions and its courses do not conform to a well-regulated system of technical education. The organization of the School and its associated activities have been the result of local convenience and financial considerations. (*Paragraph 124*)

(b) the Associateship course consisting of simultaneous theoretical and practical training for five years.

34. Since admission qualification for Kanchrapara School should be the passing of Stage III, the school should be modelled on post-Intermediate Technical College lines. The school should be reorganized to provide for (a) the general diploma course consisting of first three years during which simultaneous theoretical and practical training will be given and of the last two years during which only practical training will be imparted; and (b) the Associateship course consisting of simultaneous theoretical and practical training for five years.

Other Railway Schools may, after reorganization, remain as special types to serve the needs of Railways. (*Paragraph 125.*)

35. Since the proposed Board of Technical and Industrial Education is to assume the control, the existing Board of Control for Apprenticeship Training with its limited scope and utility should be unnecessary. (*Paragraph 127.*)

#### Chapter IX.—Engineering Education.

36. Engineering education from lower forms to the higher forms is imparted through these institutions: (a) B. E. College, Sibpur; (b) Jadavpur College of Engineering and Technology; (c) Kanchrapara Technical School, (d) The Calcutta Technical School; (e) Ahsanullah School of Engineering; and (f) Sub-overseering classes in the Junior Technical Schools. (*Paragraphs 128-29.*)

37. Drawbacks of Sibpur and Jadavpur Colleges: (i) inadequate workshop arrangements; (ii) inadequate support from industrial firms for providing facilities of apprenticeship training; and (iii) insufficient laboratory arrangements. (*Paragraph 130.*)

38. Suggested reforms in the two colleges. (i) These two colleges should impart training in higher engineering. Civil Engineering should be left mainly with Sibpur College. Other courses at Sibpur should be mechanical engineering, electrical engineering and metallurgy; (ii) the diploma course and the Associateship course should be transferred from Sibpur to Calcutta Technical School; (iii) new courses such as ship-building, aeronautics, etc., may be started at Sibpur; (iv) at Jadavpur, mechanical and electrical engineering will be taught. Oil technology may be started as a new line of development and the course of chemical technology may be raised to the level of degree standard; (v) the artisan classes at Jadavpur may be reorganized on special and more comprehensive lines. (*Paragraph 131.*)

#### Chapter X—Technical Studies under the Universities.

39. Under the Calcutta University two Technological Departments, the Department of Applied Physics and the Department of Applied Chemistry have been organized, while under the Dacca University only the Department of Applied Chemistry exists (*Paragraphs 133-38.*)

40. The Technological Departments have not as yet succeeded in growing into comprehensive organizations through which the various technical and industrial problems of the Province can be satisfactorily solved. There is an urgent need for establishing a progressive contact between these Departments, Government Departments and industry. This contact is yet to be organized. (*Paragraph 139.*)

41. It is suggested that the University Departments will fully collaborate with and take advantage of the laboratories recommended to be organized at the Central Technological Institute (*Paragraphs 140-41.*)

#### Chapter XI.—Technical Training in Textile Industries.

42. Bengal's Textile industries are sufficiently important and developed to necessitate the organization of an elaborate system of technical training. (*Paragraph 142.*)

43. The existing institutions for imparting training in cotton textile industries are: (i) Serampore Textile Institute; (ii) District and aided Weaving Schools and (iii) Peripatetic Weaving Schools and Weaving Demonstration Parties. (Paragraph 143.)

44. The Serampore Textile Institute offers these courses:—(i) Higher course; (ii) Artisan course and (iii) Operatives' training course. Besides there is a Women's Section (Paragraphs 144-48.)

45. Drawbacks of Serampore Textile Institute: (a) training imparted is not of a sufficiently high order to be useful to the industry, (b) facilities for practical training are insufficient; (c) the Institute has failed to function as an assisting apex organization for the textile industries of the Province; (d) it possesses no adequate research organization. (Paragraph 149.)

46. Improvements called for: (a) organization of a self-sufficient research organization; (b) organization of a fully equipped Department of Chemical Technology; (c) the Jute training section to be expanded and strengthened; (d) the course of studies should be raised to the status of B.Sc. (Tech.) degree; (e) admission qualification should be the passing of Stage III or I.Sc.; (f) the equipments and accommodation of the Institute should be expanded (Paragraphs 150-52.)

47. There are 9 district weaving schools at Malda, Suri, Pabna, Bankura, Tangail, Begunganj, Zorwarganj, Khulna and Dacca offering a course of one year, under the control of the Department of Industries. The training imparted by these schools to either Bhadrolog youngmen or hereditary artisans has not found to be efficient and practical enough. The drawbacks of the schools are: (i) very short courses; (ii) absence of suitable arrangements for practical training; (iii) very low admission qualifications and (iv) absence of qualified teachers (Paragraphs 153-55.)

48. Suggested reforms for weaving schools: (i) course should be for two years, (ii) admission qualification to be raised to passing of class VIII or preferably Stage II in Technical High Schools; (iii) every weaving school should have a demonstration factory; (iv) Amounts of scholarships for the trainees should be increased; and (v) qualifications of teachers and equipments should be increased (Paragraph 156)

49. The Committee does not favour provincialization of Weaving Schools. While some model weaving schools may be retained, other weaving schools should remain on an aided basis. (Paragraph 157.)

50. In respect of peripatetic weaving schools and demonstration parties, the Committee endorses the recommendations contained in the Interim Report of the Technical Education Sub-Committee of the Industrial Survey Committee on the Unemployment Relief Scheme. (Paragraph 158.)

51. The Jute Weaving Section of Serampore Textile Institute, in spite of recent addition of certain machineries is still inadequate to meet the needs of the industry. Since the Committee desires that the Institute should provide for a diploma and a degree (B.Sc. Tech.), course and that there should be organized feeder schools of the standard of Technical High Schools in jute areas, the following reforms are suggested: (a) The power loom jute section to be equipped with a spinning section and a research section, will serve the needs of higher training in jute technology; (b) Proper facilities are to be arranged for practical training in jute mills; (c) The area schools, to which artisan courses are to be attached will serve the needs of jute workers and their children; (d) The Serampore Institute will organize a short teachers' course so as to supply the feeder schools with efficient teaching staff (Paragraphs 159-63.)

52. The system of recruitment through Sirdars is uneconomical for the mills and should be discontinued in view of the arrangements proposed under which the jute mills are expected to recruit more efficient and loyal employees. (Paragraph 164.)

53. The existing institutions for imparting training in silk technology are: (i) Silk Technological Institute at Berhampore; (ii) Peddy Reeling Institute at Malda; (iii) Raw Silk Conditioning House in Calcutta and (iv) Sericultural Research and Training Institute at Dum Dum (*Paragraph 165.*)

54. The Silk Technological Institute offers two courses, viz., (a) the Artisan course and (b) the Higher course. Although the programme underlying the organization of the Institute is ambitious, in actual working it has not produced any tangible results either by improving the prospects of the industry or improving the economic position of the cottage workers. The causes of its failure are (a) inadequacy and inefficiency of the teaching staff and (b) absence of facilities for practical training (*Paragraphs 166-70*)

55. Suggested reforms: (a) to improve its efficiency and realize considerable economies, the Institute should be amalgamated with Serampore Textile Institute; (b) at Berhampore a District Weaving School with Artisan classes should be retained and (c) the reeling portion should be developed on an efficient scale in the Peddy Reeling Institute at Malda. (*Paragraph 171.*)

#### *Chapter XII.—Training in Tanning and Leather Technology.*

56. Existing facilities of training in tanning and leather technology centre around the Bengal Tanning Institute the activities of which may be grouped under three heads, viz., (i) training, (ii) demonstration and propaganda and (iii) research and experiments. The training course has recently been improved by the introduction of a diploma course for 3 years. For demonstration and propaganda among the rural muchis and Chamars as well as Bhadrolog youngmen, a number of demonstration parties have been organized. As a result of the activities in all these directions, the traditional antipathy to leather industries has been largely overcome. (*Paragraphs 174-77.*)

57. Suggested measures: (i) the Demonstration parties should exclusively cater to the needs of rural chamaris and muchis; (ii) at selected centres leather trade schools for Bhadrolog youngmen as well as sons of muchis and chamars should be established; (iii) the Institute should be renamed Bengal Government Institute of Tanning and Leather Technology; (iv) the building of the Institute should be expanded and adequate machinery installed; (v) a Boot and Shoe and Leather goods making Department should be organized and (vi) better arrangements for workshop training for the students should be made either with a private tannery or in a Commercial Tannery organized under Government Control. (*Paragraphs 182-83*)

#### *Chapter XIII.—Scope for a Wood Working Institute in Bengal.*

58. Bengal's wood working industry comprising small cottage units as well as large-scale workshops is sufficiently important to call for a specialized system of training in that line. Since possibilities of manufacturing in Bengal many imported articles are warranted by the availability of indigenous raw materials, there is distinct need for a Central Wood Working Institute in order to carry on the necessary researches and stimulate industrial development on appropriate lines. An Institute is, therefore, necessary (i) to train up hereditary artisans, (ii) to train up Bhadrolog youngmen and (iii) to carry on research work into the uses of Indian Timbers. (*Paragraphs 184-90.*)

59. The Institute should be located in close proximity to Calcutta which offers facilities of transport and proximity to markets. The Institute will serve as the apex organization in the line, provide teachers for the wood working sections of all technical schools in the province and supervise their courses of training and organize final examinations. (*Paragraph 191.*)

*Chapter XIV.—A Scheme for a Central Technological Institute in Bengal.*

60. Since Polytechnics ensure greater economies in costs and organization, for a poor country like India they may be organized on the basis of local needs and conditions. (*Paragraphs 192-93*)

61. Mr. J. Sargent, Educational Commissioner with the Government of India, suggested a Technological Institute for Bengal, consisting of (i) a Science Department, (ii) Mechanical Engineering Department, (iii) Electrical Engineering Department, (iv) Civil Engineering Department, (v) Commercial Department and (vi) an Art Department. (*Paragraph 194.*)

62. On account of its divergent teaching sections, the Calcutta Technical School may be converted into a Central Polytechnic after reorganization on these lines: (i) the Polytechnic to possess a Science Department; mechanical engineering department, electrical engineering department, a Technical High School, and trade classes, in a number of industries; (ii) the associateship course to be transferred from Sibpur to the Polytechnic; and (iii) a well-equipped research section to be organized. (*Paragraphs 195-97.*)

*Chapter XV.—Art and Industrial Education.*

63. Art education in this commercial age should be an essential part of any system of technical and industrial education, for it raises the aesthetic standard of life. India's village handicrafts in the past attained an excellent artistic level which was appreciated even by foreign countries. The present decadence of indigenous art industries is due to the loss of royal patronage and absence of inventive talents drawn into the field. Co-operation between art and industry is, therefore, called for. (*Paragraphs 198-200.*)

64. The art education imparted by the Government Art School and the Indian Art School is inadequate for improving industrial art to the desirable extent. The Department of Industries although having two Artists in its employ has not done much for the propagation of industrial art to the benefit of indigenous industries. So a more comprehensive organization is called for. (*Paragraphs 201-203.*)

65. *Suggestions.*—Under the proposed Board of Technical and Industrial Education a Special Sub-Committee consisting of the officer-in-charge of the Art Section of the Polytechnic, the Director of Industries, the Principal of the Government Art School and others, should be formed (i) to co-ordinate facilities of art education; (ii) to organize design competitions; (iii) to suggest ways and means for propagating industrial designs to the cottage workers; and (iv) to render assistance to organized industries in the form of designs (*Paragraphs 204-206.*)

*Chapter XVI.—Training of Cottage Workers*

66. The cottage workers require (i) new labour saving and more efficient production technique; (ii) methods of standardised production and (iii) new designs for meeting changing needs. Existing institutions for training cottage workers are. (a) Industrial Schools, (b) District and peripatetic weaving schools, and (c) Peripatetic Demonstration Parties (*Paragraphs 207-208.*)

67. The training for cottage workers imparted by these institutions has not been found to have been satisfactory or useful to the cottage workers for a number of reasons. The Industrial Schools failed because of (i) lack of a commercial basis of training; (ii) inadequacy of equipments and lack of good teaching staff. The Peripatetic parties failed to benefit the cottage workers for the same reasons and for certain inherent deficiencies in their organization, teaching methods and administration. (*Paragraphs 209-215.*)



68. The Committee endorses the reforms in the organization of peripatetic parties which were recommended by the Technical Sub-Committee of the Industrial Survey Committee. (*Paragraphs 216-17.*)

*Chapter XVII.—Technical Education and Women.*

69. In this commercialized age women also have to participate in technical education as a matter of necessity. In our country which has not as yet outgrown conservatism, women have special needs in the matter of receiving technical education. Different organizations are to suit the requirements of girls whether educated or not. (*Paragraphs 218-21.*)

70. Regional trade schools for girls may be organized according to local needs and convenience. For higher technical educations, girls may receive training in the same institutions with boys. (*Paragraphs 222-23.*)

*Chapter XVIII.—Apprenticeship Training.*

71. The existing system of apprenticeship training as evolved and run by the Board of Control for apprenticeship training is limited in its scope and has achieved no substantial results, in so far as the support of industrial employers is concerned. (*Paragraphs 224-27.*)

72. Efforts to organize an independent system of apprenticeship training by the Employment Adviser to the Government proved abortive. (*Paragraph 228.*)

73. Features of the suggested system:—

- (i) It should cover three categories of apprentices, e.g., (a) Student apprentices, (b) Trade apprentices and (c) Other general apprentices.
- (ii) The Employment Bureau under the Board of Technical Education is to deal with the problems of apprenticeship training and maintain touch with the industrialists.
- (iii) Test Examinations are to be organized by the Board to select apprentices.
- (iv) One or two welfare officers will be appointed to watch the progress of apprentices.
- (v) Government should offer patronage to industrial firms in the matter of store purchases for departmental purpose and facilities for the acquisition of lands and also of industrial loans and in lieu, require the firms to extend facilities of apprenticeship training to the nominees of the Board. (*Paragraphs 229-30.*)

74. The Committee recommends the adoption of the system of simultaneous theoretical and practical training in any schemes of apprenticeship training. (*Paragraph 231.*)

75. There should be attached to the Employed Bureau a small Psychological Laboratory to carry out tests of intelligence, efficiency and capabilities of different types of workers at different stages, for the purpose of imparting vocational guidance. (*Paragraph 233.*)

*Chapter XIX—Control of Technical Education.*

76. Since there exists no unified or co-ordinated control over the prevailing system of technical education, we need a competent and comprehensive body for planning, developing and controlling technical education in this province. Such a body is not only to assess the needs of technical education from time to time, but also to prescribe suitable courses of training at different grades of institutions, to arrange for periodical examinations, to distribute grants-in-aid, to prescribe suitable text-books, evolve a suitable system of apprenticeship training and to organise and promote industrial researches. (*Paragraphs 234-37.*)

77. The past achievements and existing staff equipments of the Education Department and the Industries Department do not support the placing

of technical education under the exclusive control of any of the Departments. While the Education Department is likely to lay too much emphasis on the general education at the cost of technical education, the Industries Department is not in a position to tackle successfully all aspects of technical education. So an independent body is called for. (*Paragraphs 233-40.*)

78. The proposed Board of Technical and Industrial Education for Bengal should be a representative body containing adequate representation of Education Department as well as the Department of Industries and also educational experts, University representatives and representatives of industry and the Legislature. The constitution should be as follows:—

- (1) The Hon'ble Minister for Education Department—*Chairman (ex-officio).*
- (2) A Vice-Chairman—He should be a wholetime salaried person to be appointed by Government.

*Members.*

- (3) Director of Public Instruction, Bengal.
- (4) Director of Industries, Bengal.
- (5) One non-official educationist to be nominated by Government
- (6) One industrialist to be nominated by Government.
- (7) One representative of the Legislature.
- (8) & (9) Two representatives of the Universities of Dacca and Calcutta, one each.

The Vice-Chairman will be the executive head of the Board which will function through appropriate Standing Committees. The Board should be (i) a Statutory Body, (ii) invested with executive functions, (iii) provided with block grants to be utilized by the Board. Such a Board will be in a position to act swiftly, more efficiently and devote exclusive and specialized attention to the development of technical education in this Province. (*Paragraphs 241-42*)

79. The Board should be equipped with an adequate staff consisting of one Chief Inspector and 5 Divisional Inspectors along with suitable ministerial staffs and their scales of salary should be commensurate with the responsible work to be entrusted to them. (*Paragraph 244.*)

80. An Employment Bureau should be attached to the Board and administered through an appropriate Sub-Committee. The Bureau will among other things establish and maintain contact with the industrial employers and assist the running of a system of apprenticeship training (*Paragraphs 246-47.*)

*Chapter XX —Scope for Training for Demobilized Personnel.*

81. The scope for providing training facilities for demobilized personnel after the war through the various institutions proposed to be set up under the scheme will be adequately available (*Paragraphs 249-53*)

FAZLUR RAHMAN,  
*Chairman.*

P. N. GHOSH,  
A. H. PANDYA,  
H. L. ROY,  
S. C. MITTER,  
J. M. SEN,  
A. KARIM,  
C. V. MILLER,

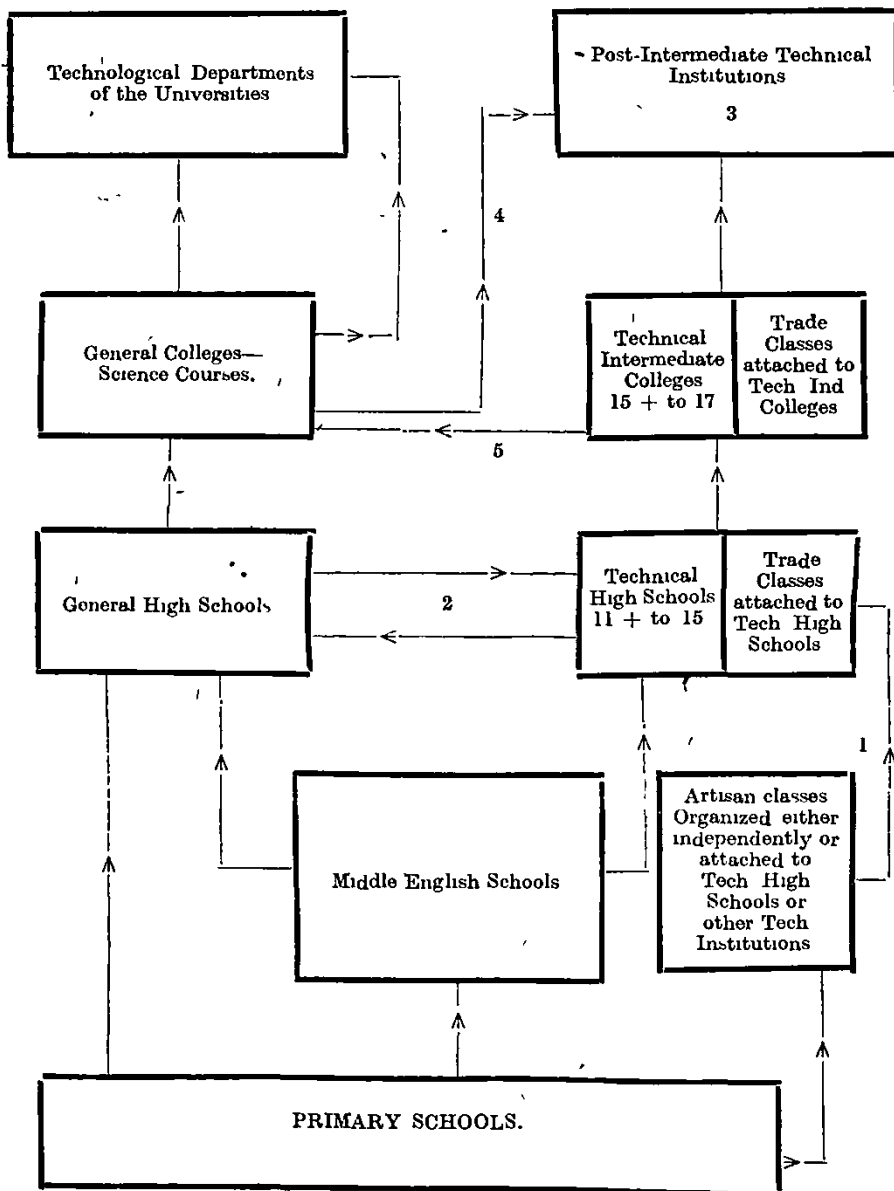
*Members*

D. N. GHOSE,  
*Secretary.*

NOTE.—Dr J N Mukherjee could not sign the Report as he was out of India.

## DIAGRAM II.

Proposed System of Technical and Industrial Education as adjusted to the existing System of General Education in Bengal.



1. Students passing out of the Artisan Classes are not to be ordinarily admitted to Trade Classes, but exceptions should be made in case of meritorious boys

2. Students will be permitted to interchange courses from General High Schools to Technical High Schools and *vice versa* only during the first two years during which the two types of schools will offer common courses.

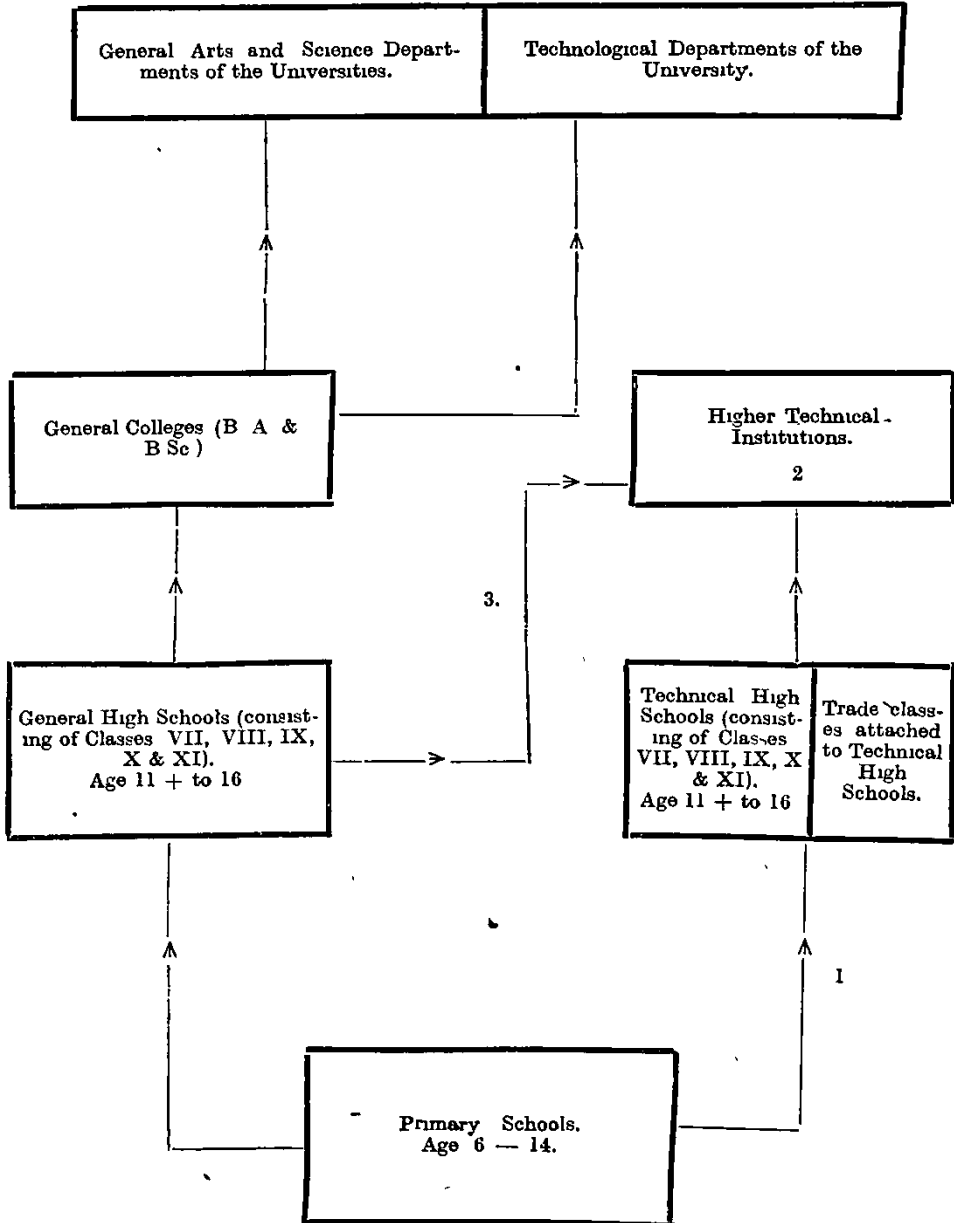
3. These institutions comprise Engineering Colleges like Bengal Engineering College, Sibpur, College of Engineering and Technology, Jadavpur, Special Technical Institutions such as Kanchrapara Railway Institute, the Central Polytechnic, and mono-technics such as the Serampore Textile Institute and the Tanning Institute

4. Only students passing I Sc or B.Sc. courses in general colleges may be admitted to the Post-Intermediate Technical Institutions.

5. Students passing out of the Technical Intermediate Colleges will also be admitted to the B Sc courses in the General Colleges.

## DIAGRAM III.

Proposed System of Technical and Industrial Education in Bengal, when reforms in General Secondary Education as suggested in paragraph 91 of the Report are carried out.



1 The diversion of students from Primary Schools to other institutions will take place at the age of 11+.

2. As in 3 of Diagram II.

3 Only students passing Science Courses of the General High Schools may be admitted into some of the higher technical institutions.

## TECHNICAL AND INDUSTRIAL EDUCATION COMMITTEE, BENGAL.

### APPENDIX I.

#### 1.—Questionnaire regarding training of Cottage Workers.

**Q. 1.**—In recommending the industrial schools for the training of craftsmen who make their living as cottage workers, the Indian Industrial Commission (1916-18) observed as follows —

“The Industrial School is, at best, a defective instrument of education owing to the non-commercial conditions under which it must necessarily be carried on. In spite of this, it seems to be the only means by which the indigenous artisan can be trained, though, in the past, through his ignorance and lack of education, and through the imperfections of their equipment and teaching staff, industrial schools have failed in the majority of cases to achieve any appreciable results, while, therefore, within the limits just specified, we regard them as altogether unsatisfactory if employed to train artisans in organised industries.”

(a) Which of the existing institutions in your district might, in your opinion, be regarded as industrial schools of the kind referred to above?

(b) Have any improvements been effected in the system of training provided for in these institutions since the enquiry of the Industrial Commission? If so, what are they?

(c) What further improvements are, in your opinion, required to make these institutions better utilised and more effective?

**Q. 2.**—Please refer to the Annexure which is a copy of a bulletin published by the Department of Industries giving outlines of the organisation of technical training in Artisan and Junior Technical Schools

(a) Do you consider that institutions of the kind described in the departmental bulletin, particularly the artisan courses, will meet the requirements of training cottage industry workers in your district other than those engaged in handloom weaving?

(b) If so, would you regard them as the equivalent of industrial schools which the Industrial Commission had in view or a distinct improvement on the latter?

**Q. 3.**—It appears from the departmental bulletin that the scheme envisaged therein provides for two distinct types of institutions, viz —

(i) Artisan Schools as such, and

(ii) Junior Technical Schools with Artisan Courses

(a) Which of these two types of institutes would you prefer to meet the requirements of your district, and why?

(b) Would you in this connection suggest any modifications in the curriculum and courses of training as set forth in the Departmental bulletin to suit the local conditions of your district?

(c) If the existing institutes there are not being run on these lines, can those be suitably reorganised for the purpose?

Please give your suggestions as to how such organisation can be effected, and

(d) Also give an idea as to the nature and extent of opportunities for employment that would be available in your district to those trained by either of the above two types of institutes.

**Q. 4.**—The Industrial Commission's concept of industrial schools tends to suggest that these institutions should, as a rule, confine themselves to the requirements of those engaged in small and cottage industries working on their own account and not comprise any technical training that can be profitably utilised only in large organised industries? Have you any observations to make in this connection?

#### 2.—Questionnaire issued to the Director of Industries.

(1) The existing system comprising different types of institutions from the lowest stage to the highest stage

(2) (i) Control of industrial and technical education —

(a) Control by Education Department,

(b) Control by Industries Department,

(c) Control by Co-operative Department,

(d) Control by the Board of Apprenticeship Training,

(e) Control by the Overseer Examination Board,

(f) Control by the Survey Education Advisory Board,

(g) Control by the Mining Education Advisory Board,

and such other controlling bodies,

(ii) Their respective functions;

(iii) Extent of control by each; and

(iv) The correlation, if any, between these different bodies.

(3) Any scheme of re-organisation that has been or is being undertaken by the Department

(4) Any proposals for the re-organisation of the industrial and technical education that the Department may like to place before this Sub-Committee.

### 3.—Questionnaire regarding training of Workers in organized industries.

**Q. 1.**—It is considered that co-operation between business and education is essential for the successful and economic working of any scheme of vocational education and for ensuring that the instruction shall be both appropriate and sufficient. Do you agree with this view?

**Q. 2.**—Kindly state the average number of annual vacancies in the supervisory grade in your industrial establishments.

**Q. 3.**—What type of men and standard of education and training you require for posts in the supervisory grade?

**Q. 4.**—(a) In making appointments to such posts, is it your practice to take in entirely untrained hands and make them pass through a period of apprenticeship at your own cost? (b) Do you find such arrangements to be convenient and satisfactory? (c) Kindly state the method you follow in filling up these posts.

**Q. 5.**—To what extent have your demands for filling up these posts been met by the existing technical institutions of the province, such as the Calcutta Technical School, the Bengal Textile Institute at Serampore (formerly known as the Government Weaving Institute), the Jadavpur College of Engineering and Technology, the Calcutta Engineering College, University Departments of Applied Chemistry and Physics, etc.

**Q. 6.**—If your demands are not met by the existing institutions, kindly state your views as to how these institutions should be re-organised to meet your demands.

**Q. 7.**—Kindly state your opinion on the views of Mr. Abbott regarding the standard of education and training that workers of the supervisory grade should receive

**Q. 8.**—If you agree that the standard of education training to be imparted by Junior Technical Schools and Senior Technical Schools as proposed by Mr. Abbott to be satisfactory for recruitment to the supervisory grade in your industrial concerns, are you willing to take in annually a number of pupils completing their courses of training successfully in such institutions to fill up your vacancies? If so, kindly state the number (minimum—maximum—average)

**Q. 9.**—If your answer to Q. 1 is in the affirmative, do you agree with Mr. Abbott that the solution of the problem of securing the co-operation of industry and commerce with education lies in the establishment by the Department of Education in Bengal of an Advisory Committee for vocational education assisted by a number of Advisory Sub-Committees as suggested by him in paragraphs 38 and 39 of his Report.

**Q. 10.**—If you do not agree with Mr. Abbott, kindly give your reasons and also state if you have any alternative proposals to make.

**Q. 11.**—Mr. Abbott in paragraphs 43 to 47 of his Report has suggested various methods by which Business assists technical education in England and other European countries. Do you think that Business in Bengal can and will assist technical education by any of these methods? If you think so, kindly state the nature and extent of assistance that may be forthcoming

If you do not think so, kindly state your reasons

**Q. 12.**—Do you agree that Advisory Committee mentioned in question 9 should have functions as described in paragraphs 40 and 41 of the Report of Mr. Abbott? If not, what are your suggestions?

**Q. 13.**—Do you consider that part-time schools for training young men already engaged in business are necessary? If so, kindly refer to the observations contained in paragraph 65 and paragraphs 164 and 173 of the Report of Mr. Abbott and give your considered views on the various points discussed therein.

### 4.—Questionnaire regarding Apprenticeship Training.

**Q. 1.**—How far does the existing system of training under the direction of the Board of Apprenticeship Training meet the requirements of organised industries in different parts of Bengal situated at a distance from Calcutta? Can the present system be suitably re-organised to extend its benefits to such industries? If so, what form or re-organisation would you propose?

**Q. 2.**—The Indian Industrial Commission (1916-18) urged the necessity of training up a number of qualified Indians in a manner that would enable them to assume responsibilities of the office of foremen and chargemen in big factories

Do you consider that the prevailing system of apprenticeship training under the directions of the Board of Apprenticeship Training adequately meets the requirements in this connection? If not, what reorganisation would you propose to give effect to the proposals of the Industrial Commission?

**Q. 3.**—Do you consider that there may be any practical difficulties on the part of the large industrial concerns, except those engaged in highly specialised lines. In taking advantage of the system of training now provided by Board of Apprenticeship Training? If so, what are they?

## APPENDIX II.

### Scheme of Training for Jute Mill Workers.

The Scheme provides, for the convenience of the trainees, two distinct grades of instruction in two different classes—one during the day time and the other during the evening. The details are as follows —

#### Day Class.

The course of study in this class extends over a period of two years. Candidates who have read up to class VIII of the Matriculation Standard are eligible for admission.

The attendance in school will be for two days in the week of 6 working hours a day from 10-30 a m to 4-30 p m. During the remaining days of the week, the students shall be required to undergo practical training in the neighbouring Jute Mills as apprentices.

The instruction to be given at this school will be purely theoretical and will be imparted through the medium of the Vernacular (Bengali)

The course of study will comprise the following three main subjects (1) Jute Spinning, (2) Jute Weaving, (3) Engineering Drawing. These will be subdivided into the following six subjects —

- (i) Jute preparing and spinning,
- (ii) Jute weaving and preparatory processes,
- (iii) Analysis and designing of jute fabrics;
- (iv) Jute spinning and weaving calculations;
- (v) Testing of Jute Yarn and Fabrics; and
- (vi) Engineering Drawing

Normally a period of 2 hours per week may be allotted to each of the subjects. The outline of the course is given in Notes A, B and C

#### Evening Class.

This class is meant for actual employees of the Jute Mills who are unable to attend the Day Class

The course of study embracing either Jute Spinning or Jute Weaving or both simultaneously, extends over a period of one year

This class will be held on 4 evenings every week—2 evenings for Jute Spinning and 2 evenings for Jute Weaving. Students may attend any one or both these classes according to their requirements. The school period shall be 2 hours every evening in each subject

The outlines of the Course in Jute Spinning and Jute Weaving are indicated in Notes D and E

It may be that many intending candidates for training in this class may not be sufficiently literate to be able to profit by attending these classes. To meet such cases it is desirable to have some arrangements in these schools for imparting the necessary general education. The subjects to be taught are as follows —

- (1) *Language*—Reading and writing in vernacular as well as in simple English
- (2) *Arithmetic*—Simple and compound four Rules, Vulgar and Decimal Fraction, Rule of Three and Percentage calculation.

To conduct both the Day and Evening Classes the services of 3 Instructors—one for spinning, one for weaving and one for engineering drawing may be necessary.

The Final Diploma holders of the Bengal Textile Institute, Serampore, with practical training for at least one year in a Jute Mill will be suitable for being appointed as teachers in Jute Spinning and Weaving under this scheme

As regards the teaching of Engineering Drawing, the teacher appointed for the purpose in the proposed Junior Technical School to which these classes will be attached, may be entrusted with the duty of teaching this subject

Instruction will be given through the medium of the vernacular, namely, Bengali. This will necessitate the compilation of necessary text-books in Bengali. Pending the preparation of suitable text-books in Bengali, the teachers may be required to explain the subject and dictate the necessary notes in Bengali

The School should be equipped with enlarged diagrams and sketches of the different machines required for the spinning and weaving departments. Models of the most important parts of the mechanisms should also be provided

The Testing Laboratory should be provided, with a conditioning oven and with suitable yarn and cloth testing machines

In the Engineering Drawing Class, models of the various spare parts indicated in the syllabus should be kept

#### NOTE A.

##### Day Class.

##### *Spinning.*

- 1 Nature and properties of Jute Fibre Methods of assorting and boiling. Significance of bale-mark
- 2 The selection of different varieties of jute for the production of different yarns The operations of softening and batching and the machinery employed The different oils used and their effects on fibre and yarn
- 3 The principles of carding and the machines employed for the purpose. Specifications of spinning of different yarns Methods of regulating weight of silver speed calculations, draft, production, etc
4. Objects aimed at drawing and doubling, different types of machines employed and specifications of the gills in common use
- 5 Different types of Roving Frames in use Calculations for draft and twist
- 6 Description of Spinning Frame, adjustment of reach, draft and trim for good result Twists and speed for different sizes and classes of yarn
- 7 Testing of yarns for counts, strength and regularity
- 8 Doubling and twisting and the objects of these processes
- 9 Horse power required for the different machines and the methods of determining it Labour required of each machine, cost of production, waste, wages, power, insurance and other necessary costs

#### NOTE B

##### Day Class.

##### *Weaving*

- 1 Jute yarns and the forms in which they are supplied to the manufacturer, hanks, rolls, spools, bobbins and cops
- 2 Selection of warp and weft yarns for a given kind of cloth consideration of reeds, shots, counts and weaves for any specified fabric.
- 3 Warp and weft winding machinery Function and action of typical machines speeds and production
4. Dressing machine, construction, driving, winding on warp on loom beam Dressing mixture ingredients Points to note in dressing-drying, temperature measuring and marking, relative advantage of warp made on dressing machine and warping mill and of dry and starched warps
- 5 Types of camp leaves, construction and uses Method of warp drawing in, arrangements for casting out Reeding and tying on.
- 6 Power loom Its primary and secondary motions Top-rollers mountings for Hessian, Sacking and other twill fabrics The drawing of Tuppets, cams or wipers. Positive and Negative uptake motions, fabrics faults and their occurrence.
- 7 Yarn and cloth calculation Systems of yarn counting Jute, Linen, Cotton and Woollen Equivalent counts in yarns numbering of ply yarn, resultant counts, Reed and cane numbering Estimation of warp and weft quantities Fabrics shrinkage
- 8 Cloth structure Use of point paper. Plain weave warp and weft Ribs, Hopsaks, systematic construction of simple twills, diamond and kindred fabrics
- 9 Cloth analysis for design, draft and weaving plan
- 10 Power required to drive the machines and the production obtained from each together with wastage during operation.
- 11 Testing of fabrics for tensile strength
- 12 The finishing of Jute Fabrics Principles underlying the treatments employed

#### NOTE C.

##### Day Class.

##### *Engineering Drawing.*

1. Use of instruments (Drawing), construction of plain figures, principles of projection of solids, plans, elevations and sections of solids.



- 2 Plan and Diagonal scales and their uses.
- 3 Plan, elevation and section of models and simple machine parts
- 4 Rough Sketches of the following —

Foundation bolts and locking nuts, fly wheel, spur wheel, different forms of shafting, different forms of coupling, plummer blocks and pedestals, pulleys and speed cones, eccentrics. Forms of pipes and cylinder flanges and jointing them

#### NOTE D.

##### Evening Class.

##### *Jute Spinning*

1 The jute fibre The characteristics of various jutes colour, strength, length, and suitability for particular yarns The selection of various kinds and marks of jute for different qualities and makes of yarns

2 Batching Striking up of opened jute The selection of different varieties of jute for the production of different yarns The operations of softening and batching and the various machineries in general use The different oils used and their effect. Treatment of root ends and cuttings

3 Curding—Function of carding, various kinds of curding machines and their adjustment Construction and specifications of card clothing, methods of regulating weight of sliver and calculations of speeds

4 Drawing Frames—Function of machines, number in a system, effects of drafting and doublings, influence of doublings in feed side and delivery side, action of typical machines, specifications of the gills in common use

5 Roving—General description of the roving machine Calculation for draft twist, uptake, consideration of the uptake motion and its adjustment

6 The spinning frame, its mechanism, methods of driving and controlling start and stop, draft, twist, builder and production calculations, twist constants for various types of yarns

7 Testing of yarn for count, strength and regularity

#### NOTE E.

##### Evening Class.

##### *Jute Weaving.*

1 The forms in which yarns are supplied to the manufacturer warp and weft winding machinery

2 Dressing machines; their construction and driving The starches used, Brushing, Drying, Reeling, measuring and marking the yarn. The relative advantages of warps made on the dressing machine, linking machine and warping mill and of dry and starched warps

3. Power loom—construction and mechanism The drawing of tappets, cams or wipers Setting and driving of tappets Positive and negative uptake motions. Tuning of different motions Heald reversing arrangements.

4 Design paper and the method of indicating the movements of each cam leaf. Weaves employed, the dissection of patterns for simpler fabrics made from jute to determine draft for the cams and weaving plan

5 Calculations for obtaining the weights of warp and weft for the above fabrics

6 The finishing of jute fabrics Principles underlying the treatments employed

7 Power transmission and most suitable speeds for various machine

#### APPENDIX III.

##### Scheme for the establishment of District Leather Trade Schools.

(1) **Course of Instruction and subjects to be taught.**—The course of instruction will be for two years commencing from the first Monday in August. Only *bona fide* permanent residents of Bengal, particularly of the Charmakar community, who are physically fit to undergo hard labour, will be eligible for admission to the school. The training will be purely of a practical nature, and therefore every student will have to work all the processes involved in the manufacture of leather, boot and shoe-making and leather goods making with their own hands

*Subjects to be taught.*

##### *First Year*

(a) Principles and methods of tanning by lectures in Bengali

(b) Practical tanning including machine work

## Second Year.

- (a) Boot and Shoe-making  
(b) Leather goods making.

(2) **Number of students to be admitted.**—Only 10 students will be admitted per annum

(3) **Fees.**—The training will be given free for the present.

(4) **Stipends.**—Four stipends of Rs 5 each per month, to be awarded to deserving Charnakar students for the full period of training subject to good conduct and satisfactory progress.

(5) **Examinations.**—Practical examinations will be held at the termination of each year of training and departmental certificates will be granted to students passing the final examination

(6) **Estimate of expenditure involved.**—4 Non-recurring—Land and buildings—

	Sq. ft.	Rs.
Land—3 bighas at Rs 1,000 per bigha	.. .. .	3,000
<b>Buildings—</b>		
(Tannery 120' × 30')	3,600	
Boot and Shoe-making shop (30' × 20')	600	
Office rooms and stores (60' × 20')	1,200	
Quarters for two durwans (20' × 15') of covered area with pucca walls, brick-on-edge floor and corrugated iron roofing at Rs. 2 per square foot	300	
	<hr/>	
	5,700	11,400
<i>Add</i> —5 per cent. contingency on Rs 11,400		470
Latrine (services, 5 seated)		500
Urinals (2 seated)		200
		<hr/>
	Say	16,000

(a) *Tannery section—*

	Rs.
<b>Equipment—</b>	
8 masonry pits (6' × 5' × 6') for washing liming and deliming hides at Rs 50 each	400
4 masonry pits (3' × 3' × 3') for washing liming and deliming skins at Rs. 15 each	60
10 masonry pits for tanning hides and skins (6' × 5' × 5') at Rs 50 each	500
Tube-well, pump and necessary pipe installations for water supply	1,120
	<hr/>
<b>Total</b>	2,080

**Drums and machines—**

1 big drum (6' × 5')	500
1 small drum (4' × 3')	250
1 shaving machine	2,400
1 staking machine	2,000
1 glazing machine	1,500
1 sole leather rolling machine	2,100
1 Buffing machine	1,134
1 oil engine 20 H P	3,000
Line shafting, pulleys, belting, etc	1,500
1 oil engine 20 H P	3,000
Line shafting, pulleys, belting, etc	1,500
Installation charges of drums, etc	500
Small tools and accessories and furniture	1,200
	<hr/>
<b>Total</b>	16,084

(b) *Boot and shoes and leather goods making section—*

	Rs.
<b>Equipment—</b>	
2 Singer Sewing machine	800
Small tools and implements	500
Furniture	500
	<hr/>
<b>Total</b>	1,800

	Pay pro-	Ultimate
	posed in 5-year plan	cost under present scheme.
	Rs.	Rs
<b>Establishment—</b>		
1 Manager on Rs. 130—10/2—140—20/2—220	200	167
1 Tanner on Rs. 90—10/2—120—5/2—145—15/2—175	100	128
1 Machine shaver on Rs. 40	50	40
1 Flesher on Rs. 30	30	30
1 Hand shaver on Rs. 35	35	35
1 Glazer and staker on Rs. 30	30	30
1 Drumman on Rs. 20	20	20
4 Unskilled workmen on Rs. 15 each	60	60
1 Oil engine driver on Rs. 30	45*	30
1 Fitter on Rs. 50	50	50
1 Clerk on Rs. 35—35—40—2/2—60	35	48
1 Peon on Rs. 13—1/5—17	15	15
	<u>745</u>	<u>653</u>

Total annual Rs 7,836.

	Rs
Supplies and services Purchase and repair of tools and implements	300
<b>Contingencies—</b>	
Cost of hides and skins	5,000
Cost of treatment materials	1,454
Cost of power	950
Miscellaneous	600
Watch and ward and sanitation	530
Rates and taxes	20
	<u>8,554</u>

(b) *Boots and shoes and leather goods section—*

(To work from the 2nd year of the operation of the scheme)

	As in	Ultimate
	five-year plan	cost under present scheme.
	Rs	Rs
<b>Establishment—</b>		
1 Instructor in Boot and Shoe making on Rs. 90—10/2—120—5/2—145—15/2—175.	100	128
1 Instructor in leather goods on Rs. 90—10/2—120—5/2—145—15/2—175	100	128
1 Upper closer on Rs. 50	50	50
2 Bottoming mistries on Rs. 30 each	60	60
	<u>310</u>	<u>366</u>
Total annual Rs $366 \times 12 =$ Rs 4,392		
<b>Supplies and services—</b>		
Purchase and repairs of tools and implements		100
Stipends to apprentices (ultimate)		240
<b>Contingencies—</b>		
Cost of leather and sundries		1,000
		<u>1,340</u>
Total recurring Rs 22,422.		
<b>Receipts (annual)—</b>		
Estimated receipts from sale of leather		6,000
Estimated receipts from boots and shoes and leather goods		500
		<u>6,500</u>
	Total	<u>6,500</u>

**APPENDIX IV.**

**Schemes for the establishment of a Boot and Shoe and Leather Goods Making Department.**

**Name.**—The name of the Department is proposed to be Boot and Shoe and Leather Working Section to be attached to the Bengal Tanning Institute

**Location.**—It should be built close to the Bengal Tanning Institute with which it should work in close co-operation This will be to mutual advantage as tanning and

shoe making and leather work are closely allied and interdependent. For thoroughness of training, the staff and students of one should be in a position to acquire as much knowledge as possible of the other. For instance, it will be of immense benefit to tanning students to be able to see how the leathers they make are used in shoe and leather goods manufacture, similarly shoe and leather goods making students will benefit by knowing how leathers they use are produced.

**Course.**—The course will be of three years. Two and half years will be spent at the Institute for theoretical and practical work and 6 months in a commercial Shoe Factory like that of Bata Shoe Co., Ltd., or any other commercial concern subject to suitable arrangement. If no such arrangement can be made, full three years will be spent at the Institute. It is expected that the work at the Demonstration Shoe Factory will give fairly good experience of commercial work.

**Examination and Diploma.**—At the end of three years there will be a Final Examination in theoretical and practical subjects of the syllabus on passing which a Government Diploma in Shoe and Leather Goods Manufacture will be awarded to successful students. The Diploma will be in the First, Second and Third Class according to marks secured in the Final Examination.

**Fees.**—Free tuition will be given for the first 6 years after which a suitable fee may be charged if circumstances warrant it.

**Caution money.**—Each student will be required to deposit a sum of rupees 10 at the time of admission as caution money against breakage or loss of tools that will be given to them for work. The money will be returned deducting dues for loss and breakages after the completion of the training.

**Minimum qualification for admission.**—School education up to the Matric Standard, intelligence, health, possibility and facility for continuing in the line will be main considerations in selection.

**Stipends.**—Three stipends of Rs 20 each per month will be provided and awarded to deserving candidates each year. The award may be made by competitive examination or other considerations in necessitous cases.

## SYLLABUS OF INSTRUCTION.

### I.—For Boot and Shoe Making.

**1.—Anatomy of the Foot and Foot Measurement.**—The foot skeleton and its component bones, joints, muscles and ligaments. The foot arches. The skin of the foot, foot ventilation and hygiene. Foot troubles, e.g., blisters, callosities, corns and bunions, their causes, remedies and consideration in shoe making.

Types of feet. Influence of race, social position, occupation and habits on the types. Characteristics of the feet of the people of the various parts of India.

Deformities and abnormalities of the feet, e.g., club foot, claw foot, Hallux rigidus, Hallux valgus, Hammer Toe, Metatarsalgia, etc.

Measuring the feet for making shoes. Different methods of measuring. Recording the measurements and transferring them on to the last.

**2.—Lasts.**—Wooden, iron and aluminum lasts. Information of Indian wood suitable for last making. Making various models. Different types of lasts. Sizes, fittings and grading of lasts. General idea of last manufacture.

**3.—Shoe Designing.**—Sketching of shoes, copying of known designs. Making original designs for specific purposes, economic, utilitarian or artistic. Specification.

**4.—Pattern Making.**—Selection of last to type of shoe and fitting it with "Forms". Making of standards for different types of boots and shoes. Designing and cutting sectional parts with allowance for closing and lasting. Rights and Lefts patterns. Patterns for the bottom stock, e.g., insoles, outsoles, stiffeners, heel lifts and top pieces. Grading. Making working patterns.

**5.—Leathers and other materials for upper and clicking.**—Various materials used for uppers and linings, e.g., leather of different types and various fabrics. Tannages and characteristics of commercial upper leathers and their suitability for different classes of foot-wear. Measurement of leather substance in millimeters. Characteristics and suitability of fabrics used for making uppers. Tannages and characteristics of lining leathers and properties of fabrics used for lining.

Methods of placing patterns on leather and fabric and making them with an eye to economy, strength and appearance of the shoe. Clicking or cutting uppers and linings by hand and machine. Clicking machinery, knives and other implements.

**6.—Upper closing.**—Skiving by hand and machine. Skiving machinery. Folding, punching, etc. Fitting and closing. Stitching threads of silk, linen and cotton, stitching machines of different types.

**7.—Preparation of bottoming materials.**—Sole leather and its tannages. Sides, butts, bends, shoulders and bellies, their characteristics and utilization. Substance measurements in irons. Leather and other materials, e.g., leather boards, card boards,

etc., used for insoles Leather for heel lifts and top pieces Leather and fibre stiffeners Cutting of soles, insoles, etc., by hand and machine Cutting press and knives Channelling by hand and machine Heel buldings, welt cutting, etc. Shanks of various materials and their characteristics Filling materials of different kinds.\*

**8.—Lasting.**—Conditioning the upper Lasting on wooden and metallic lasts. Tools, implements used in hand lasting Lasting tacks and tangles. Lasting machine.

**9.—Sole sewing and stitching.**—Different kinds of threads of hemp, flax and cotton. Preparation of thread. Needles, awls and waxes Different kinds of stitching, e.g., lock stitch, chain stitch and hand stitching by awl and bristle. Various types of stitching machinery, screwing machine

**10.—Heel attaching, sole levelling and heel breasting.**—Doing the operations by hand and machine

**11.—Finishing.**—Finishing by hand shaping, rasping, scraping, sand papering the heels and edges. Setting edges by hot and cold irons Edge marking, scouring buffing Staining and polishing the sole Various inks, stains waxes and heel balls used Finishing the upper and various upper dressings

Finishing by machine —Machinery and tools for the purpose Heel paring, scouring and padding Trimming and setting of the edge Sole scouring and abrasives used. Sole washing and painting Washes, inks and stains used. Sole polishing. Wax polishes, Cleaning, treeing and noning Applying dressings on the uppers Dressings generally used

**12.—Cost accounting, Book keeping, etc.**—Departmental and total cost using costing cards Keeping various account books Making Profit and Loss Accounts and Balance sheets

#### II.—For Leather Goods Manufacture.

**Leather Trunks Suitcases and Attachi cases.**—Usual dimensions Cutting patterns. Foundation materials, e.g., paste and fibre boards, plywood, etc

**Leather.**—Different types of leather used for superior and common classes of goods, e.g., buffalo and cow hide leather and leather from calf, goat and sheep skins and their tannages Cutting, skiving and pasting leather on the foundation. Adhesives.

**Frames.**—Cap corners.

**Stitching and closing.**—Different kinds of threads used, preparation of thread. Tools and machinery used

**Handles.**—Designing and making metallic parts—bolts, rivets, locks, etc.

**Linings.**—Different materials used Designing of pockets for ordinary and fitted cases

Usual contents of fitted cases

Finishing

Costing

**Bags and fancy leather goods.**—Making gents' travelling and lady's hand bags of different dimensions and designs, brief cases, portfolios

**Money bags and various other articles.**—Designing and pattern cutting. Methods of decorating

**Leather and linings to be used.**—Zip fasteners clips, press buttons, etc.

Finishing

Costing.

Holdalls, leather straps, sambrowne belts, ordinary waist belts, wrist bands, etc.

Materials used, methods of making

Finishing.

Costing

**Art Leather Work.**—Leather suitable for the purpose Tools and implements used. Methods of work.

*Estimate of expenditure involved.*

Non-recurring—

Land—3 bighas to be acquired by Government at Rs 8,000 per bigha . . . . . 24,000

Buildings—

(1) Lecture room (40' × 30')	1,200
(2) Demonstration Factory (150' × 40')	6,000
(3) Principal's room Teachers' sitting room and office (80' × 20')	1,600
(4) Stores (60' × 20')	1,200
(5) Museum and Library (40' × 20')	800
(6) Durwangs' quarters (30' × 15')	450

Total 11,250

At Rs. 7 per sq. ft. of covered area—11,250 × 7 . . . . .	78,750
(7) Latrines and Urinals . . . . .	3,000
(8) Surface drains, compound walls, inside roads, etc. . . . .	6,000
	1,11,750
Equipments—	
Machinery and Power plant (as per Appendix I) two sets . . . . .	1,00,000
Tools, implements and furniture . . . . .	3,000
Electric installation—fans, light, etc. . . . .	3,000
	2,17,750
Total Non-recurring Say Rs	2,20,000

### Recurring—Staff.

Description of the post	Qualifications required.	Scale of pay	Average annual cost
1	2	3	4
			Rs. a
Principal	Knowledge of the theory and practice of shoe making Experience of work in a commercial Shoe Factory in responsible capacity Must be able to lecture on all the twelve subjects of the syllabus and supervise production in the Demonstration Factory.	300—25/2—500	4,720 6
Assistant Principal	Knowledge of the theory and practice of shoe making Experience of work in a commercial Shoe Factory in a responsible capacity essential as he will have to take charge of production in the Demonstration Factory	130—10/2—140—20/2—220	2,004 0
Upper Making Instructor	Shoe designing, pattern making upper materials, upper clicking and closing Must be a practical man with works experience and knowledge of drawing, capable of giving practical instruction in subjects 2 to 6 of the syllabus	110—15/2—200	1,818 6
Bottom Making Instructor	Experience in bottom stuffs, lasting, sole stitching, heel building and attaching with works experiences capable of giving practical instruction in subjects 7 to 10 of the syllabus	75—8/2—115—5/2—135—10/2—175	1,451 1
Finishing Instructor	Experience in hand and machine finishing of shoes with works experience, capable of giving practical instruction in subject 11 of the syllabus	75—8/2—115—5/2—135—10/2—175	1,451 1
1 Skilled Upper Closer	Capable of working Skiving and upper sewing machines Should know hand skiving also A practical man of mistry type	50—5/2—75	736 5
1 Skilled Hand Sewing Mistry	Must know hand lasting, awl and bristle sewing	50—5/2—75	736 5
1 Machine Sewer	Must know to work a Blake and a Screwing machine	50—5/2—75	736 5
1 Finishing Mistry	Must know hand and machine finishing	50—5/2—75	736 5
Skilled Suit-case Maker.	Must know the making of and be able to give practical instruction in making suit and attache cases, etc A practical suit case making mistry wanted	50—5/2—75	736 5
Skilled Fancy Leather Goods Maker	Must know the making of hand bags and other fancy leather goods Should be capable of giving practical instruction in the subject A practical bag making mistry wanted	50—5/2—75	736 5
Instructor in Art Leather Work	Must know the theory and practice of Art Leather work to be able to teach the subject to the students under training Experience of commercial production of Art Leather goods preferred	75—80—85—5/2—110—10/2—130	1,196 7
Drawing Teacher	Must know free hand drawing and should be able to sketch shoes, leather cases, etc., and teach students	75—80—85—5/2—110—10/2—130.	1,196 7
Teacher of Accounts	Must be a qualified accountant, capable of teaching costing book keeping as required for subject 12 of the syllabus	75—80—85—5/2—110—10/2—130.	1,196 7

## Factory Operatives

## Checking Department—

		Rs.	a
1 Clk. ker	Rs 40—2/2—50 per mensem	534	9
1 Machine Skiver and Beader	Rs. 30—2/2—40 per mensem	414	9
1 Machine closer	Rs. 30—2/2—40 per mensem	414	9
1 Fitter	Rs 25-26—2/2—40 per mensem	384	12

## Bottom Stock Department—

1 Sole, insole and top piece machine cutter.	Rs 25-26—2/2—40 per mensem	384	12
1 Welt splitter and channeller	Rs 25-26—2/2—40 per mensem	384	12
1 Pulling over machine man	Rs. 50—5/2—75 per mensem	736	5
2 Hand lasters	Rs. 25-26—2/2—40 per mensem each	769	8
2 Packing Fillers	Rs 20—1/2—29 per mensem each	582	6

## Sole Sewing and Stitching Department—

1 Blake and screw machine mistry	Rs. 50—5/2—75 per mensem	736	5
1 Goodyear welting and stitching mistry	Rs 50—5/2—75 per mensem	736	5

## Heeling Department—

1 Heel attaching and breasting mistry	Rs. 25-26—2/2—40 per mensem	384	12
2 Heel lift cutters and heel builders	Rs 20—1/2—29 per mensem each	582	6
1 Slugging and loose nailing mistry	Rs. 40—2/2—50 per mensem	534	9

## Finishing Department—

1 Channel closing and sole levelling mistry	Rs 25-26—2/2—40 per mensem	384	12
1 Sole paring and finishing mistry	Rs 40—2/2—50 per mensem	534	9
1 Sole painting mistry	Rs 20—1/2—29 per mensem	291	3
1 Sole ironing mistry	Rs 30—2/2—40 per mensem	414	9
2 Upper finishers	20—1/2—29 per mensem	582	6
Fitter mechanic A fitter mistry capable of looking after line shafts and machinery.	Rs. 50—5/2—75 per mensem	736	5
Electrical mistry. Qualified to look after the electrical equipment, e g , motors, etc	50—5/2—75 per mensem	736	5

## Office Staff—

1 Clerk	Rs. 50—5/2—75	736	5
1 Store Keeper	Rs. 40—5/2—60	586	10
1 Dultry	Rs 13—1/5—17	175	6
2 Peons	Rs. 13—1/5—17 per mensem each	350	12
2 Durwans	Rs. 18—1/5—22 per mensem each	470	10

Total 33,041 4

**Provision for stipends.**—Three stipends each year, nine in all when the scheme will be in full operation of Rs 20 per month each =  $9 \times 20 \times 12 = \text{Rs } 2,160$

**Contingencies.**—For thorough training of the students in Boot and Shoe making Demonstration Factory attached to the Institute should produce 150 pairs of Police and Jail Warders' boots and 350 pairs of Civilian foot-wears of different types and designs monthly or 1800 pairs Police and Jail Warders' boots and 4200 pairs of Civilian foot wears of different types a year, besides, the students will also be taught manufacture of different types of useful leather articles such as suit and attaché cases, purse, wallets, hand bags, portfolio, etc , as well as articles of art leather work.

	Rs.	a.
Materials for the above output	20,000	0
Power	1,800	0
Freight	1,200	0
Miscellaneous	2,400	0
	25,400	0
<b>Supplies and services.</b> —		
Repairs and renewals	1,000	0
	61,601	4
Total recurring	61,601	4
Say	62,000	0
Expected receipts from the sale of output	20,000	0 annual.

**Enclosure.**

*List of machinery required (two sets) for the proposed machine equipped Boot and Shoe and Leather Goods Making School and the Demonstration Factory to be attached to it.*

One Chinking Press with six sets of Punching Knives  
 One Skiving machine  
 Four different types of Singer Sewing Machines  
 One Beading machine  
 One Eyeletting machine  
 One Perforating machine  
 One Double-end Buffer Press  
 One Sole Splitting machine  
 One Welt Splitting machine  
 One Pulling over machine  
 One Apex Power Channelling machine.  
 One Blake's Sole Sewing machine  
 One Welt Stitching machine  
 One Goodyear Fair Stitching machine.  
 One Standard Screwing machine.  
 One Mackay Heel loading and attaching machine  
 One Slugging machine  
 One Loose Nailing machine.  
 One Channel Closing machine  
 One Sole Levelling machine  
 One Combined Paring and Finishing machine  
 One Stamping machine (with individual motor drive).  
 Approximate normal cost for each set Rs 50,000  
 Exact prices could not be obtained on account of war condition.

**APPENDIX V.****Scheme for a wood working institute in Bengal.**

The Institute is to be designated, "Central Wood Working Institute, Bengal "

**Objects of the Institute.**—The main objects of the Institute are —

- (a) To impart efficient training in the various branches of Wood Working crafts in Bengal
- (b) To carry on research work regarding the introduction of better methods of working with improved tools and appliances and better designs and the utilization of indigenous woods in wood working industries of the Province.

Maximization of profits should not be the aim of the institution. It is not intended that the students should be slaves of wages. This should not be interpreted as an exclusive bar to the acceptance of orders from outside which may be of practical educative value to the students. What should be aimed at is a balance between profit and educative value that can be derived from execution of such orders. Provisions should exist in the institution for the manufacture of architectural and domestic furniture and fittings in all styles and designs, drawing and construction of all such work being carried out in the school as a part of the course of instruction.

**Buildings for the Institute.**

The Institute buildings should be equipped with various blocks containing administrative offices, drawing classes, lecture theatre, show room, store, cabinet making and joinery shop, machine wood working shop, upholstery shop, painting and polishing shop and research laboratory in carrying out researches on waste products of sawing, wood-seasoning, veneering, lacquering, etc

The school should also be provided with a kiln seasoning plant

**Library.**—Books of reference and periodicals dealing with the subject of instruction are to be provided for the uses of the students and the staff

**Examination.**—School examination should be held towards the close of each session and no student will be promoted to the next higher class unless he succeeds in securing qualifying marks for the promotion.

**Certificates.**—Certificates countersigned by the Principal of the Institute and endorsed by the Vice-Chairman of the Board of Technical and Industrial Institutions may be awarded to students on successful completion of the course for which they were admitted. The names of the successful candidates are to be published in the official gazette.

**Scholarships and Stipends.**—The School should have provision for awarding scholarships and stipends to the deserving and meritorious students. No scholarship or stipend should be awarded to any student who fails to keep the required attendance during the year.



**Courses of Instruction.**—(1) *General Wood Working Course (3 years)*—The course should be intended for —

(1) *Practical work*—Correct use of tools and appliances, models of joints employed in wood work, construction of many articles such as tools, chairs, seats, tables, desks side board, chests almirahs, etc.

(2) *Carving*—Preparation of simple designs for carving and fret work, tracing and cutting, setting in grounding and modelling, carving of tope, edges, mouldings, pilasters and brackets, etc.

(3) *Drawings*—Free hand drawing, model drawing and drawing of common objects, geometrical drawing, technical drawing, etc

(4) Setting out of simple tables, chairs, almirah racks and ordinary furnitures.

(5) Qualities and estimating

(6) *Theory*—Elementary theories on timber, defects in timber, converting of timber, metal fittings tools and appliances, etc.

Candidates should at least be a passed 7th standard of a High School and be not less than 12 years or over 21 years of age. Preference will be given to those who have passed the stage II in the proposed Technical High Schools.

(B) *Advanced wood Working Course (2 years)*—The course provides a specialised and advance training for furniture and allied trades. Instruction is to be given on advance lines in the subjects taught in the general wood working course and also in prospective and practical drawing and setting out. Lectures on materials, trenches, casting and estimating modern designs and up-to-date method of construction and productions and handling of labour are to be delivered.

Candidates must have passed the general wood working course

(C) *Upholstery Course (2 years)*—Instruction is to be given in upholstering of chairs, stuffed seats and backs, buttoned and loose covers, caning, double and independent spring seats, etc. Leather covering and renovating should as well be taught.

Principles elementary drawing are also to be taught and lectures to be delivered on upholstery materials, estimating and casting of upholstery work.

(D) *Wood Finishing Course (1 year)*—Instruction is to be given in polishing, painting, lacquering, drawing (lettering, stencil designing and cutting) and theories on painting, polishing materials, etc., their properties and uses.

(E) *Machine Tool Course (2 years)*—The course is intended for the training of machine wood working mechanic with a view to meet the need of this class of skilled labour.

The course is very elaborate and deals in tool making, turnery-hand and automatic, production-saw, fram (circular, band, fret, dimension sawing) planers, edgers, etc., maintenance and repairs of tools, appliances and ordinary machineries, drawing-free hand, perspective and isometric, geometrical drawing, working drawing, estimating and quantities, theories of machine employed, drives and bearing, lubrication and lubricants, handling of labourer, etc.

The students of the advanced classes in cabinet making and joinery may with the expressed permission of the Principal, have training in elementary painting and polishing and upholstery so as to be capable of taking charge of workshop and works foremen and supervisors.

(F) *Kiln Seasoning Course (1 year)*—Kiln operatives are every day in demand for the Railways and big workshops engaged in this country. The development of this branch of science for the development of the present resources and for placing the wood working industry on a more profitable basis. The course should combine both theory and practice. This is a very interesting course but the students below Stage II would hardly find it interesting, for during this period they will have to attend boilers and pumps, weigh samples, keep record of temperature and humidity inside kiln, to supervise loading and unloading of kiln chambers with the help of the kiln staff. The standard will have to undertake the full responsibility of the machines in kiln and their working during their duty period.

The instruction should be based mainly on (a) timber and its structure, (b) principles of kiln drying, (c) theory of wood working machines and prime movers, workshop practical, etc., whenever required, and (d) the drawing class will have 20 desks and 20 tools. Each student should be provided with a drawing board and "T" square only which will cost Rs 9 approximately.

There should be two drawing classes one for elementary course and the other for advance course. Each drawing class should also be provided with a demonstration table and two black boards.

The drawing classes should also be provided Charts, Models, etc.

#### Equipment for the Wood Working Shop required for a class of 20 students.

(a) One working bench filled with two vices for use of two students at Rs 30 approximately per bench and Rs 20 approximately for two vices. 10 such benches

fitted with 20 vices for a class of 20 students costing Rs. 500 approximately. If any student in excess of the specified numbers are admitted, provision should be made for the extra expenses involved in such admission.

(b) Each student will be provided with a set of wood working tools which will be his charge in the tool-drawer fitted on his side of the bench one student will be provided with a set of tools as in list No 1 and the other student on the same bench will be provided with a set of tools as list No. 2.

(c) Each class should be provided with a tool-rack consisting of tools as in list No. 3. This rack will be in charge of the instructor who will use the tools for demonstration purposes and issue them to the students.

#### List No. 1.

Name of tools.	No.	Value.	
		Rs	a p.
1. Jack Plane at Rs. 4-8	1	4	8 0
2. Smoothing Plane at Rs 2-12	1	2	12 0
3. Panel Saw at Rs. 2-6	1	2	6 0
4. Hammer at as. 12	1	0	12 0
5. Screwdriver at as 12	1	0	12 0
6. Barel No 25 at Rs. 1-4	1	1	4 0
7. Marking gauge at as 8	1	0	8 0
8. Marking knife at as. 4	1	0	4 0
9. Tinner Chisels—			
1"            }			
3/4"          }	4	3	0 0
1/2"          }			
3/8"          }			
10. Footrule wooden	2	1	8 0
11. Matrix Chisel—			
1/2"          }	2	2	0 0
3/4"          }			
12. Spoke Shave (Wooden)	1	1	8 0
13. Scraper	1	0	8 0
<b>Total</b>		<b>21</b>	<b>10 0</b>

Rs. 22 approximately.

#### List No. 2.

##### Tools for the other side of the work bench.

	Rs. a. p.	
1. Jack Plane	1	4 8 0
2. Smoothing Plane	1	2 12 0
3. Tenon Saw	1	3 4 0
4. Hammer	1	0 12 0
5. Screwdriver 6"	1	0 12 0
6. Marking Gauge	1	0 8 0
7. Tri Square 9"	1	1 8 0
8. Footrule wooden	1	0 4 0
9. Marking knife		
10. Firmer Chisels—		
1"            }		
3/4"          }	3	1 8 0
1/2"          }		
3/8"          }		
11. Matrix Chisel—		
1/2"          }	2	2 12 0
3/4"          }		
12. Spoke Shave Iron No. 51	1	1 12 0
13. Scraper	1	0 3 0
<b>Total</b>		<b>19 14 0</b>

Rs. 20 approximately.

## List No. 3.

## Class rack tools for general use.

	Rs.	a.	p.
Rip Saw	2	6	4 0
Compass Saw	2	3	4 0
Mitre Saw	1	2	6 0
Dove-Tail Saw	2	4	6 0
Saw Set	1	10	8 0
Trying Plane (wooden)	2	13	8 0
Trying Plane (Iron)	1	15	0 0
Smoothing Plane (Iron)	2	15	0 0
Robbet Plane (Iron)	1	8	8 0
Robbet Plane (Wooden) 1", $\frac{3}{4}$ ", $\frac{1}{2}$ " and $\frac{3}{8}$ "	4	11	0 0
Plough Plane Wooden with cutter	1	14	0 0
Fillister Plane (wooden)	1	13	12 0
Bull-nose plane (Iron)	1	1	12 0
Mitre Square 6"	2	3	4 0
Matrix Gauge	2	3	6 0
Draw Knife	1	2	10 0
Racket Brace	2	14	8 0
Adze (Basoola)	2	3	2 0
Oil Stone (Washite)	1	1	12 0
Oil Stone (India)	1	3	4 0
Piler	2	1	2 0
Pincers	2	1	2 0
Twist Bits	6	3	6 0
$\frac{1}{2}$ ", $\frac{3}{8}$ ", $\frac{1}{4}$ " 1", $\frac{1}{2}$ ", and $\frac{3}{4}$ "	12	3	8 0
Quill and Gembit bills of required sizes	2	1	12 0
Counter sink bit			
Dove-Tail Chisel—			
$1\frac{1}{2}$ ", 1", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", and $\frac{1}{4}$ "	6	8	0 0
File rasp 8r	2	1	10 0
File half round 12r and 8r2	2	1	12 0
Hand Anger (Barm)	1	1	12 0
Compass Plane	1	1	12 0
Compass $3' \times 1\frac{1}{2}'' \times \frac{1}{2}''$ $4' \times 1\frac{1}{8}'' \times \frac{1}{8}''$	2	11	12 0
Total		199	4 0

Rs. 200 approximately.

## List of Plants and Machineries.

## (A) Wood working machine section.

	Rs.	a.	p.
1. Band Saw machine type D. G. M. No 3 (motor driven)	1 p.c.	1,935	0 0
2. Arbor Saw bench No. 511 "Fay and Egan" (Motor driven)	1"	1,950	0 0
3. Cutter moulding and planning machine 20" x 9" K. H. E. type, (motor driven)	2	7,600	0 0
4. Circular Saw bench, (J Q. X or Q D type) (motor driven)	1	1,500	0 0
5. Drum Sand Papering machine (S V B type)	1	3,150	0 0
6. Single vertical spindle moulder, No 5, Fay & Egan	1	2,100	0 0
7. Hand placing and jointing machine (V. N. J. type 16" wide)	1	1,530	0 0
8. High Speed cut off saw bench for Saw up to 16" No. 700, Fay & Egan	1	1,320	0 0
9. Power grinding stone fitted with gutting machine (H. P. type)	1	910	0 0
10. Boring machine (D. E. type)	1	3,100	0 0
11. Planning and Thicknessing machine "Little giant" motor driven	1	1,175	0 0
12. Band saw and circular saw sharpening machine, automatic (Gibson)	1	1,600	0 0
13. Grinder (wood)	1	500	0 0
14. Batten for cutters (L N type)	1 p.c.	70	0 0
15. Wood Working lathes (7" to 12" M. F. type)	3	7,140	0 0
16. Wood Boring machine, "Triumph" (hand operative)	2	900	0 0
17. Dowell Makin machine, $1\frac{1}{2}$ " (F O. type)	1	605	0 0
18. Small circular saw for small dimensions 8" (Duro)	1	265	0 0

				Rs.	a.	p.
(B) <i>Millwright section.</i>						
19.	Metal turning lathe, 6½' × 8' (Wilson)	..	1	2,000	0	0
20.	Metal drilling machine No. 2, 1½'	..	..	750	0	0
21.	Emery Wheel grinder	..	..	305	0	0
22.	Small Blower	..	1	55	0	0
23.	Large Blower	..	1	80	0	0
24.	Black smith furnace	..	1	150	0	0
25.	Bandsaw Brazier (J. X. type)	..	1	110	0	0
26.	Small metal punching machine (P. I)	..	..	125	0	0
27.	Small hand-drilling machine D. O. 22	..	1	155	0	0
28.	Small hand grinder	..	1	95	0	0
(C) <i>Kiln section.</i>						
29	(1) 5 B. H. P. 440 Volt motor with switch disc fans and other equipments	..	..	15,000	0	0
	(2) Vertical boiler with cross tube 12 N. H. P.	..	..			
	(3) Electric Oven	..	..			
	(4) Humidity recover (Building included)	..	..			
(D) <i>Carving section.</i>						
30.	Fret-Saw machine automatic G. I. D. type (24" × 3")	..	1	6,900	0	0
31.	Craging benches with complete set of tools	..	10	750	0	0
32.	Clay modelling benches with complete set of tools	..	10	750	0	0
(E) <i>Painting and Polishing section.</i>						
1.	Duco painting plant	..	1	1,000	0	0
(F) <i>Upholstery section.</i>						
	Sewing machine	..	2	500	0	0
	Lump sum on tools	..	..	150	0	0
				55,575	0	0
Rs. 56,000				0	0	approximately.

For the efficient management of the institution the following staff are indispensable :—

Head and items.	No	Estimate of annual on initial pay.
		Rs a. p.
Principal—Director of Industries (ex-officio).	..	..
<i>A. Pay of Establishment—</i>		
Wood Technologist (300)	..	1 3,600 0 0
<i>Kiln Section—</i>		
Kiln Engineer—(ex-officio Superintendent)(150)	..	1 1,800 0 0
Timber drying attendant (40)	..	1 480 0 0
<i>Cabinet Shop—</i>		
Cabinet Instructor (150)	..	1 1,800 0 0
Foreman Mistry (75)	..	1 900 0 0
Assistant Instructor—1st year to 3rd year (40)	..	3 1,440 0 0
<i>Machine Shop—</i>		
Machine Tool Instructor (125)	..	1 1,500 0 0
Foreman Mistry (75)	..	1 900 0 0
Band-Saw Instructor (40)	..	1 480 0 0
Machinist Instructors (3 on 40)	..	3 1,440 0 0
Turnery Instructor (40)	..	1 480 0 0
		14,820 0 0
Carving Instructor—Mistry for carrying out experiments—Rs. 50	1	600 0 0
<i>Millwright Shop—</i>		
Foreman Mistry—Rs 75	1	900 0 0
Forge—Rs 40	1	400 0 0
Turner Fitter—Rs 40	1	480 0 0
<i>Drawing Class—</i>		
Drawing Master—Senior—Rs. 75	1	900 0 0
Drawing Master—Junior—Rs. 50	1	600 0 0
<i>Upholstery Shop—</i>		
Upholstery Instructor—Rs. 40	1	480 0 0
Assistant—Rs 30	1	360 0 0
<i>Wood Finishing Shop—</i>		
Polishing Instructor—Rs 30	1	360 0 0
Assistant Instructor—Rs 20	1	240 0 0
Electrical—Instructor Rs 30	1	360 0 0
<i>General Office—</i>		
Head Clerk—Rs 120	1	1,440 0 0
Accountant—Rs 75	1	900 0 0
Two assistants, one of whom must be typist—Rs. 45	2	1,080 0 0
Costing clerk—Rs 45	1	540 0 0
Despatcher—Rs 30	1	360 0 0
Store Clerk—Rs 45	1	540 0 0
Store Attendant—Rs. 15	1	180 0 0



of securing machineries, etc., for setting up new factories have also been solved to a great extent. As the raw materials for manufacturing porcelain goods, glass and enamels are available in huge quantities in India, efforts are being made by the Central Government for the utilisation of these raw materials in the manufacture of high class goods, by carrying on investigations in the proposed Central Glass and Silicate Research Institute. In view of these considerations we feel that if a full-fledged Ceramic Section is organized under the Central Polytechnic, it will fulfil a distinct need of the Province.

2. Under the Department of Industries, already a Ceramic Institute has been organized in a small way at a cost of Rs 26,000, mainly for the purpose of training artisans and of making and distributing bodies for use by cottage workers. Its scope is, therefore, very much limited and it deals with only pottery goods. This organization with its present equipments may well serve as the nucleus for the bigger and full-fledged Ceramic Section which we envisage for the Polytechnic. Such a section will have to fulfil the following functions —

(1) To train up literate young men in commercial processes of manufacture with the improved technique and up-to-date machinery so that after the completion of training, they may easily find employment in the existing factories on decent remuneration. There has been at present a great dearth of skilled technicians and in the future also the demand is not likely to fall off on account of the rapid expansion of ceramic industries in the country. The different courses of training under the section should be organized as follows.—

(a) *The Artisan Course.*—This course may be on the lines in which the present Ceramic Institute is functioning.

(b) *The Higher Course which will correspond to the Post*—Technical Intermediate College stage. Students passing stage III or general Intermediate Science will only be admitted to this course. The standard of training imparted will be distinctly higher and more specialized than the Artisan Course. It will involve (i) sound knowledge of physics and Silicate chemistry including analysis of raw materials, bodies and glazes, and (ii) engineering knowledge, specially machine drawing, designs and plans of furnaces and construction, etc.

(c) *The Degree Course to which only students having passed B Sc. will be admitted*—The training imparted should be still higher than what will be provided for under (b). After the completion of this course, students will be offered facilities of post-graduate research in ceramic industries in the Research Laboratory to be attached to the section

(2) In the attached factories, the students will be given a thorough training in the commercial processes involved in the manufacture of various ceramic goods.

(3) To carry out experimental research work and investigations with Indian raw materials in order to assess their suitability and efficiency towards production of high class pottery, enamel, and glass wares comparable to the imported products in respect of quality, and durability

3. **Different Sections.**—The Department will thus have the following sections:—

(i) The Training Section in which different courses as outlined above will be taught.

(ii) Research and analytical laboratory for carrying out investigations and standardisation of the manufacture of different kinds of wares.

(iii) A commercial factory attached to it fully equipped with up-to-date machinery and improved types of furnaces to carry on the commercial processes of manufacture.

4. As the Ceramic Industries include pottery, glass, enamel, refractories and various other types of articles, it will not be possible for the Polytechnic at the first stage to be fully equipped with Research Laboratories and three or more factories for production of all the different articles. It is, therefore, suggested, that only one pottery demonstration factory may be started at the first instance and in the Research Laboratory, investigations and experimental research work for producing best types of glass, enamels, porcelain and refractories may be carried on, in order to increase the commercial activities in glass and enamel, commensurate with the results achieved.

5. In order that the full benefit of the activities of the Ceramic Section may be available to the glass, pottery and enamel factories of Bengal, it is desirable that collaboration between these factories and the section should be ensured and fostered. To this end representatives of prominent factories may be co-opted as members of the Advisory Committee of the Central Polytechnic or of the particular Sub-Committee

which is to deal with ceramic groups of industries. In determining the detailed syllabus of training for the Ceramic Section, the advice and suggestions of such representatives should be sought as a matter of course.

#### APPENDIX VII.

##### A review of past enquiries and findings on control of Technical Education.

###### (a) *Indian Industrial Commission (1916-18).*

The views of the Industrial Commission on the subject are contained in paragraphs 177 and 178 of their report and are as follows —

**177. Arguments for control by Department of Education.**—Although we have proposed to place the control of technical and industrial education under the Department of Industries, we are aware that, especially in regard to the former class of education there is a strong body of opinion in favour of retaining it under the Director of Public Instruction

This opinion appears to be based on the following grounds, firstly, that the Department of Education cannot be dissociated from these forms of teaching without loss, on account of the importance of method, with which that department is naturally more familiar than any other, secondly, that any form of teaching which is removed from the Department of Education may lose prestige in the popular mind, thirdly, that all technical and industrial training must include some degree of general education, with which the Department of Education is organized to deal.

**178 Arguments for control by Department of Industries.**—In meeting these arguments, it must be borne in mind that, in the first place, education designed to produce men who will readily find industrial employment must in any case be very largely controlled by an agency which, by its training and constant association, is in touch with the industries that will furnish that employment. Both in devising educational schemes and in ensuring by inspection that they are actually followed in working, this class of agency must have a predominant part. It is not enough to appoint a man with an industrial training as an inspector of industrial schools; he must throughout be kept in touch with industries and industrialists, or the training given will soon degenerate. Speaking generally, the different forms of technical and industrial education have as their object either the training of a man who will ultimately direct industrial operations or the production of a workman skilled in some form of handicraft. Of the success of the teaching, the private industrial employer must remain the ultimate judge. The Department of Industries is the only Government organization capable of entering into this point of view, and the only one with which he can readily associate himself. It is the only agency of any kind that can correlate the training to the requirements as ascertained by it. Almost every educationalist of standing who appeared before us was in general agreement with these views

Our conclusions are strengthened by a consideration of the nature of the various forms of technical and industrial education, the necessity of which has been indicated in our report. In the case of industrial schools, where craftsmanship is the all-essential feature of the training, the small amount of elementary general education that is required can easily be supervised by any person of ordinary intelligence whilst the teaching of craftsmanship must be provided and controlled by an agency which knows from practical experience the type of employee required by an industry, and can judge if the requirements have been fulfilled. Thus the Education Department is not likely to be able to do, judging by the results of its past efforts in this direction. In the case of artisans who are trained in shops, the same arguments apply, and it will be easier for a Department of Industries to maintain the necessary relations with railway or private management. The superior training for foremen, which will be given under somewhat similar conditions but to better educated persons, and will involve a greater amount of theoretical teaching, seems to fall into the same category, the only question is whether the theoretical teaching requires any degree of control by experts in the method of imparting teaching generally. The danger of allowing the theoretical to outweigh the practical aspect of the training must be remembered. It must also not be forgotten that the experience of industrial and technical training in other countries has evolved its own theories, traditions and expert teachers, of which the Department of Industries can make a more understanding use than the Department of Education. The control of the foregoing forms of education should, therefore, rest with the Department of Industries. The advice and co-operation of the Department of Education should be obtained in respect of general educational subjects, both in framing the courses of instruction and in deciding on the methods of teaching and inspection.

It is the only where some form of higher theoretical instruction is needed, such as that proposed by us for engineers and specialised technologists, that any question arises of the participation of the Department of Education in the control. Part of the education of engineers and the entire training of men for posts of specialised technologists should, we have suggested, be given in institutions of collegiate rank. Their expenditure should be administered and their teaching controlled by joint boards on which the

Department of Industries, the local University and employers should be represented. We have already explained the relations which should exist between the Universities and these colleges\*.

(b) *Bengal Retrenchment Committee (1923).*

In 1923 the problem was considered by the Bengal Retrenchment Committee whose proposals on the subject are quoted as follows —

"232 The administration of technical and industrial education is divided at present between two departments. While the institutions we have referred to are under the Industries Department, the Dacca Engineering College and the Sibpur College—both important colleges—are under the Education Department. We do not think this divided control can make for the economy or efficiency, and if the greatest advantages are to be derived from the materials available, technical and industrial education should be under a single administrative head. On the whole we consider that the greatest benefit would accrue from placing this subject under the Education Department, to which the inspector of technical and industrial schools or institutions would be transferred. We recommend that a small well qualified, Board of Technical Education be formed to advise the Minister. The Board should absorb the activities of the Joint Technical Examination Board, the Amin Examination Board, the Board of Control for apprentice training, and advise on mining education and cognate subjects. The Director of Industries should, we think, be a member of the Board."

(c) *Bengal Unemployment Enquiry Committee (1924)*

In 1924, the subject engaged the attention of the Bengal Unemployment Enquiry Committee who recommended as follows —

"(B) **Technical Education (both communities).**—We strongly recommend the immediate adoption of a comprehensive scheme for technical education (the term being used in its widest sense including vocational and industrial instruction)—

(1) As a means to this end we strongly recommend that a Board of Technical Education should be established for the control of what may be described as the training both theoretical and practical, for industry and commerce. The functions of this Board should include—

- (a) The provision of education facilities for the training of workmen, supervisors, foremen and managers for all the existing industries including mining and jute.
- (b) The establishment and control of standards of theoretical and practical training
- (c) The conduct of examinations
- (d) The control of the standards of all institutions providing the theoretical training through grants-in-aid
- (e) The estimation and publication of the prospects of employment in various occupations and the courses of training to be followed to enter such occupations.

\*This is discussed in paragraph 160 of the report which reads as follows.—

"160 **Expansion of engineering colleges into technological institutes.**—It will be necessary in the immediate future for Government to consider the more general question of the part to be played by the existing engineering colleges and the Universities, in providing for the increasing need in India for scientific, technical and technological training. We feel convinced that, as the development of the country proceeds, the number of students, will increase and that, in consequence, at no distant date it will be found desirable to abolish the school departments of these colleges and to make provision for the education of subordinates in separate institutions, which, not being of University rank, will be placed under the control of the Directors of Industries. It is urgently necessary to prepare for a higher technological training which will provide the means whereby the physical science students of the colleges affiliated to the Universities may learn to apply their knowledge of industrial uses. The simplest way of meeting this demand would be to expand the engineering colleges into technological institutes by the creation of new departments. At present they are chiefly occupied with the training of civil engineers. We have just recommended that they should make provision for the higher technical instruction of mechanical and electrical engineers, and we anticipate that industrial expansion will justify the starting of departments of general technological chemistry, which, in each college and teaching University, will specialise to the extent necessary to meet at any rate the more prominent local needs. We regard it as certain that public opinion will demand that these colleges shall be connected with the local Universities and that the students shall be able to obtain University degrees. To this we think no serious objection can be raised, provided that the terms of association leave the colleges free to frame their own courses of study, reserving to the Senates of the Universities the right to prescribe which shall be selected as qualifying a student to enter for a University degree. The internal administration of the colleges should be controlled by a Board of Council, the members of which might be nominated by the Department of Industries, the University and public bodies representing employers. This Council should have the privilege of delegating a certain number of its members to represent it on the Senate."



- (f) Assistance to trained men in finding employment through the establishment of an employment bureau for those who have been trained according to the standards set down.
- (2) The total Government grant for this form of education should place under the control of the Board subject to Government audit
- (3) The composition of the Board should be representative of industries and commerce as well as of the general public with a leaven of educationists”
- (d) *Government decision on the recommendations of Bengal Unemployment Committee (1925-26).*

*Reference from Secretary, Agriculture and Industries Department*—During the years 1925 and 1926 the recommendations of the Bengal Unemployment Committee in regard to the creation of a Board of Technical Education engaged careful attention of Government and the issues involved in the problem were clarified in a note of the Secretary, Agriculture and Industries Department, to the Director of Industries in which the latter was requested to frame, in collaboration with the Director of Public Instruction, a definite scheme on the basis of the proposals of the Unemployment Committee. Relevant extracts from this note which contained in printed proceedings of Government (Agriculture and Industries Department) Nos 3 and 4 of 1926, are set forth below—

“The Committee (i.e., the Bengal Unemployment Committee) recommend that the work of fostering industry and technical education of all kinds should be handed over to a new Board to be called the Board of Technical Education. In paragraph 25 they suggested that the present Board of Control for Apprenticeship Training in part carries out the functions which the new Board is expected to discharge, but that so far the former has confined its activities to training to mechanical and electrical engineering only, and the Committee are of opinion that “its functions should be extended, its powers should be increased, its composition should be definitely laid down with full representation of employers and the public. It would be given a definite annual lump grant by Government to carry out the object in view, viz., the provision of facilities for the training of men for definite employment in industries and commerce.” It is further mentioned that this grant will of course be subject to audit by Government but that beyond this the Board should have full control of its finances and that it will thus be in a position to exercise control of the institutions under it through grants to the working expenses of these institutions.” As already mentioned, the Committee further recommend [vide paragraph 71(4)(a) of the Report] that an Employment Bureau, financially assisted by Government should be attached to this Board of Technical Education; and in paragraph 26 they remark that one of the functions of this Board should be “to survey and as far as possible to forecast the probable supply and demand in any particular field within their control as otherwise” technical education and training which so many of our witnesses seem to consider as a panacea would lead to a state of things in another field very similar to the present state.

At present the control of technical education is divided between the Education and the Industries Departments. The Government Commercial Institute, the School of Art, the Sibpur Engineering College and the Ahsanullah College of Engineering and Industrial Zenana Classes at Dacca are under the Education Department, whereas the Serampore Weaving Institute, the Technical Institutions in the mufassil, Comilla Survey School, the Kanchrapara Technical School, the Mining Classes, the Calcutta Research Tannery and the proposed Calcutta Technical School are all under the Industries Department. This arrangement was arrived at under recent order of the Government. In paragraph 24 of their report the Committee make mention of educational facilities in respect of commerce, shipping, banking, accountancy, actuarial work, architecture, etc. In paragraphs 25 and 31 they make mention of training in engineering and other technical industries and their recommendation is to the effect that the proposed Board of Technical Education, which they recommend, should take over the control of education under all these heads, including mining and jute [vide recommendation in paragraph 71B(1)(A)].

This proposal raises a very large question. In the first place, if this recommendation is accepted, it will involve the placing of the Government Commercial Institute, the Sibpur Engineering College, and the Ahsanullah School of Engineering, etc., under the control of the proposed Board of Technical Education and this will have to be very carefully considered by Government before such an arrangement can be sanctioned. It is not clear what amount of control the proposed Board will exercise over these institutions. I have searched in vain in the evidence for enlightenment in this connection.

There is another aspect of the proposal which is *prima facie* open to criticism, viz., the amalgamation of the various branches of technical instruction under one Board. The Retrenchment Committee made a somewhat similar recommendation in paragraph 323 of their report, viz., that a small well-qualified Board of Technical Education which should absorb the activities of the Joint Technical Examination Board, the Amin Examination Board and the Board of Control for Apprenticeship Training, and advise on Mining Education and cognate subjects, be formed, and that the Director of Industries should be a member of the Board. This recommendation was carefully considered by Government and was rejected. As a matter of fact, it was opposed not only by the Director of Industries but also by the various Boards mentioned above, and His Excellency

recorded the opinion that such a Board, to be fully representative, would have to include most of the members of the existing Boards and would, therefore, be too unwieldy and neither be more efficient nor more economical than the present practice. The recommendation of the Retrenchment Committee, however, was obviously made for the purpose of effecting economy and it contemplated the abolition of the existing Boards, whereas the present recommendation appears to be made not for the purpose of economy but with a view to co-ordination of the work of the various Boards. From their remarks in paragraph 25 it is obvious that the Committee intend that the Board of Control for apprenticeship training should be developed with a view to exercising supervision over the whole field of technical education. The Committee probably did not intend that the existing Boards should be abolished. They possibly intended that the other Boards should not be abolished but should be represented on the enlarged Board and in this sense the proposal is of a different nature from that of the Retrenchment Committee which recommended "a small Board of Technical Education" which should absorb "the activities of the existing Boards. Further as both the Director of Industries and the Director of Public Instruction, who were aware of the decision of the Government on the Retrenchment Committee's recommendation referred to above, have concurred in the present recommendation, it may be presumed that this recommendation is intended to be free from the objections from which the Retrenchment Committee's recommendation suffered. It will appear from the Committee's observations in paragraph 31, that they propose that the Board of Technical Education should exercise many of the functions which are exercised by the Director of Industries himself at present, the Director presumably merely being a member of the Board in an advisory capacity and that the entire grant for technical education should be made over to their Board, whose duty should be to establish different classes of technical institutions and to allot grants-in-aid to them."

(e) *Views of Director of Public Instruction.*

In expressing his views on the subject, the Director of Public Instruction doubted the wisdom of placing the Bengal Engineering College under the proposed Board (i.e., under its direct administration) but he admitted at the same time that the prevailing system of control of such institutions as the Bengal Engineering College, the Dacca Engineering School and the Commercial School was very unsatisfactory. He drew attention to the fact that the Director of Public Instruction used to have a sort of technical Assistant called "Superintendent of Industries" to advise him in the control of such institutions; but since the abolition of the post he did not feel that the organization of his office was ideal. The views of the Director of Public Instruction on the subject of reference were summed up as follows:—

- (a) Such institutions for technical education as could suitably be placed under Governing Bodies to manage the institutions with a block grant subject to audit and inspection by Government
- (b) Such institutions as it may be inexpedient to place under Governing Bodies with full powers should still be administered by Government, but expansion or modification of their activities should only take place on the advice of such Board or Boards of Technical Education may come into existence.
- (c) If on detailed examination a single Board of Technical Education proves possible, this should be inaugurated.
- (d) If it proves feasible to inaugurate the Board, all allocations of funds for expansion shall be made by Government on the advice of the Board, whether to directly administered institutions or to self-governing institutions enjoying a block grant.
- (e) If a single Board proves impossible, a strong Subordinate Department of Technical Education should be established either in the Department of Industries or in the Department of Education, working in close contact with the various present Boards, and any necessary new Advisory Boards such as a Board of Commercial Education that may be found necessary. I may mention that the Commercial Institute Committee may take helpful recommendations to this end, when it sits, such subordinate department could, working through or with the various Boards, perform all the functions of the proposed Board, but would have to be well organised, and run by the right man. All technical (Engineering, Commercial, etc.) institutions ought to be under the same control.

(f) *Views of Director of Industries.*

The Director of Industries had a discussion on the subject with the Director of Public Instruction and in concurrence with the latter he noted his views as stated below drawing attention to the disadvantages from which the proposal of the Unemployment Committee suffered —

- (1) To be effective it would require to be a small Board.
- (2) It would presumably be constituted with an expert in each of the following technical subjects —
  - (a) Engineering,
  - (b) Commerce,
  - (c) Mining,

- (d) Art,
- (e) Agriculture,
- (f) Chemical Industries, etc ,

and the allocation of funds would result in a kind of tug-of-war between the members in the interests of the special form of education which they represented.

(3) The special Board's experts which at present exist for each type of education would still be necessary.

(4) Such a Board would not be in a position to criticise the technical proposals of the present Boards which are framed of experts in each particular form of education.

(5) The Board at this stage would have no independent source of revenue.

The Director of Industries stated that the Director of Public Instruction and himself had agreed that the following policy should be recommended to Government —

(1) Such Institutions for Technical Education as are sufficiently developed and substantial to be placed under a Government Body with a Block grant from Government should be so treated as recommended by the Calcutta University Commission.

(2) Instead of forming a Technical Education Board all technical education should be under a strong branch of one department for the sake of uniformity and co-ordination, be that the Department of Education or the Department of Industries and this strong branch department should work in close contact with the existing technical Boards such as the Board of Control for Apprenticeship Training, Mining Education Advisory Board, if one formed"

In addition to the above, however, the Director of Industries put in a note of his own which is quoted as follows —

"The above is the same as the proposals which I put forward in 1922 when the question of control of technical education was under consideration. Practically all technical and industrial education was at that time transferred to the Department of Industries, the Principal exception being the Bengal Engineering College, the Ahsanullah Engineering School, the Government School of Art, the Government Commercial School. A strong branch department for technical education has been formed in the Department of Industries and the working has been carried on in close contact with the existing Education Advisory Board in such particular line. In engineering education the present scheme simply lacks the co-ordination which would result from the inclusion of the two institutions giving the highest stage of engineering education in the general system. The training in the Commercial Institute has a direct bearing on the question of employment in commerce and banking and as I put forward on the previous occasion, would be most naturally associated in its control with the Department of Industries, while the education given in the Government School of Art, could be developed on the practical side in such a manner as to lead to greater opportunities of employment on completion of training. The Director of Public Instruction agrees with me that all technical education should be under the control of one department. If that department is the Department of Industries the strong branch department contemplated is already in existence, if on the other hand it is the Department of Education a strong branch department has to be created and staffed."

Thereupon the consideration of the proposal of the Unemployment Committee for the formation of a Central Board of Technical Education was dropped by Government by the end of April 1926.

(g) *Report of the Sub-Committee of the Board of Control for Apprenticeship Training, regarding further constitution and status of the Board (1927).*

In 1927 the subject of the control of technical education was incidentally touched upon by a Sub-Committee (consisting of Messrs S C Stuart-Williams, H. I Mathews and H W B Moreno) of the Board of Control of Apprenticeship Training which was set up in 1921 on the recommendations of the Mukherjee Committee. The duties of this Board were envisaged by the Mukherjee Committee to be as follows —

- (1) The conduct of apprentices' admission examination,
- (2) A general control over technical education within schools and technical institutions,
- (3) The co-ordination of this technical education with practical training;
- (4) The regulation of courses of study;
- (5) The conduct of the admission examination to the mechanical engineering classes at Sibpur;
- (6) The conduct of final examinations for apprentices not proceeding to Sibpur;
- (7) The grant of diplomas to these apprentices and to those who finish at Sibpur,

About the time of the enquiry referred to above the activities of the Board were confined to conducting the specified examinations and centred round the Calcutta Technical School and the Railway Technical Schools at Kancharapara, Kharagpur and Lilloah. The theoretical training at these schools were, according to the original

scheme, to be supported by practical apprenticeship training to be given in the case of the Calcutta Technical School by a number of engineering workshops in the city and in the case of the Railway Technical Schools, by their respective workshops. In actual practice, however, the Calcutta Technical School, having its own Governing Body, had been conducting a separate admission examination of a lower standard for taking in boys who were not qualified enough to get through the admission test of the Board. This precipitated the development of an anomalous position which greatly impaired the influence and status of the Board, leading ultimately to the enquiry in 1927 by the Sub-Committee of the Board, as previously mentioned.

The enquiry of this Sub-Committee has a relevant bearing on the study of the control of technical education in Bengal for two reasons. In the first place, the Mukherjee Committee expected the Board of Apprenticeship Training to constitute the nucleus that should, in course of time develop into a full fledged comprehensive organisation for the control of technical education in this province. As a matter of fact they stated that the functions of the Board should include "a general control over technical education in schools and technical institutes". Secondly the proposals of Sub-Committee appointed by the Board contain suggestions that closely impinge on the problem of the control of technical education as such. Accordingly, the relevant extracts from the report of this Sub-Committee are quoted below—

- "We think it should be not an Advisory Board but an executive body. We think the Chairman might possibly be the Minister-in-charge of the Department and that the Director of Industries might be ex-officio the Deputy Chairman of the Board; that the Board include if possible, the presidents of influential representative of the Chambers of Commerce, the University of Calcutta, the Education Department, the Bengal Legislative Council, and of the most important schools and colleges while the commercial element should be reinforced by at least two or three gentlemen representing the important workshops within the province, and in addition, there should be representatives of the classes from which the apprentices come. In the next place, the Board should be entrusted by the Government of Bengal with a large measure of responsibility for industrial training, education and development. Consequently, it should have submitted to it and should accept, reject or modify, the annual budgets of all institutions subordinate to it and it should receive substantial grants from Government for the financing of development schemes submitted to it by these institutions and receiving its approval.
- 12 To emphasise the importance and independence of the duties of such a Board, we should suggest their being constituted by statutory authority and with some such title as 'Commissioners for Technical and Industrial Development, Bengal'
  - 13 We recognise that our proposal, if approved and brought into being, will involve considerable changes in the Department of Industries, but we have not regarded a discussion of this matter as being within our terms of reference.
  - 14 It is only, we think, by some such radical change in the status of the Board that it can be ensured the prestige and powers which will enable it adequately to meet what appears to us an aim of cardinal importance, the steady progress of the province along the lines of industrial development."

(h) *Report of Mr. A. Abbott CBE, on Vocational Education in India (1937).*

Recently the question engaged the attention of Mr. A. Abbott, CBE, in the course of his joint investigation with Mr. S. H. Wood, M.C., of the problems of educational reorganisation and particularly the problems of vocational education in the United Provinces and the Punjab. The proposals of Mr. Abbott in this regard are based on certain general principles which deserve to be considered in connection with an investigation of the problem in this province as well. Mr. Abbott first considered how best to secure the co-operation of industry and commerce with education. His views in the matter are contained in paragraphs 38, 39 and 40 of his report. He then considered the authority in whom the control of the Technical Education should be vested. His views on the subject are contained in paragraphs 139 and 140 of the report. These paragraphs are quoted below—

- "38 *An Advisory Council for Vocational Education*—We believe that the solution of the problem of securing the co-operation of industry and commerce with education lies in the establishment by the Department of Education in each Province of an 'Advisory Committee' for vocational education, which would be properly representative both of industry and commerce and of education. In each Province, it would necessarily include the Director of Public Instruction, the Director of Industries, two or three principals of important vocational schools, and four or five business men selected and appointed by the Provincial Government itself, not as representing interests, but on account of their knowledge and experience of particular branches of industry and commerce and their willingness to contribute to the solution of the problems confronting the Department of Education.

This Council, as its name implies, would have advisory powers only. It need not be large since it would entrust most of its detailed work to appropriate Advisory Committees, each dealing with one of the main branches of industrial or commercial education and reporting to it. Necessarily, these Sub-Committees would consist of members nominated by the Council and possessing the same kind of educational or business qualifications as the members of the Council itself.

39 *The Chief Advisory Sub-Committees*—There would necessarily be Advisory Sub-Committees dealing respectively with education for.—

- (a) Engineering
- (b) The Textile industries.
- (c) Agriculture
- (d) Small scale and Cottage
- (e) Other industries of major importance.
- (f) Commerce

It is of special importance that the Advisory Sub-Committees concerned with the Textile and the small scale industries should include representative with the knowledge needed to advise on the application to them of art

40 *The Function of Advisory Sub-Committees*—The main functions of the Sub-Committees would be to draft curricula and syllabuses of instructions, to advise as to the equipment needed for carrying these out effectively, to suggest where schools should be set up, to visit the schools regularly and in general to do everything in their power to ensure that the branch of vocational education in which they are specially concerned is really successful.

As regards the curricula and syllabuses, a great wealth of material of this kind exists in Great Britain, as well as in other European countries and this could be made available for use in India. We do not suggest that either the curricula or the syllabuses used in other countries should necessarily be adopted as they stand, but they are the result of many years of experience, and would undoubtedly serve as a useful basis of discussion when instruction specially suitable to Indian conditions and needs is being planned.

41 It is important to emphasise the fact that in any Advisory Sub-Committee of the kind we have described, the representatives of business and of education do not perform exactly the same function when schemes of instruction are being drawn up. Each party brings into the common pool a contribution based on its own special knowledge and experience, essentially the procedure is as follows—

- (a) Industry and trade define their educational needs as precisely as possible, that is, they prepare a specification stating the attainments and the qualities which they wish their recruits to have. Obviously, in a new scheme, they would be performing a most useful service if they were able to give a quantitative estimate of the annual intake into business of suitably qualified recruits within the area with which they are concerned. This involved, in fact, the kind of industrial survey, with a limited objective only, to which we referred to in an earlier section of this Report (Section 5)
- (b) The representatives of education examine the specification in order to ascertain whether it is one which it is proper and practicable for the schools to satisfy. If they are convinced that it is, they proceed to draft suitable curricula and syllabuses
- (c) These are considered by the full Advisory Sub-Committee and when agreement is reached, submitted for approval to the Advisory Council itself and then put into operation.

Although this is the essential method of procedure, its various stages are not usually so clearly articulated as our description suggests. In many instances within our knowledge, an individual representative of education who has himself had experience of industry or commerce draft curricula and syllabuses which are submitted to the full Sub-Committee almost at its first meeting and become the subject of discussion.

\* \* \* \* \*

139 There remains for discussion the important question of the control of the trade, industrial and technical schools, that is whether they should be transferred to the Department of Education when this assumes responsibility for a certain measure of vocational education, or whether their control should remain, as at present, with the Department of Industries. The latter course was recommended in 1918 by the Indian Industrial Commission, which had carefully considered the various factors to be taken into account in reaching a decision on this point (Sections 178 and 179 of their Report), and their recommendation was accepted and acted upon.

140. We are bound to point out that in nearly every great industrial country of whose system of vocational education we have any knowledge (and we have obtained information on this point from more than twenty different countries)

technical education and general education are administered by the same Department of State, i.e., the Ministry of Education, although this Ministry has, usually, separate sections each dealing with a particular branch of education. Nevertheless, we are not disposed to recommend that at the moment any transfer of the trade, industrial and technical schools should be made from one department to another though we believe that such a transfer may ultimately be necessary. Our reasons for this conclusion are —

- (a) It is not desirable to modify an existing arrangement, which is generally understood and accepted, unless quite cogent reasons exist.
- (b) The schools, as now organised, are often productive industrial undertakings rather than schools. Many of them buy materials, convert them into finished goods and sell the product, and their aim is, in many instances, to give manual skill rather than scientific knowledge.
- (c) The Department of Education as yet have no staff competent to inspect and advise on technical education whereas the Department of Industries in both provinces have officers of suitable experience and knowledge.
- (d) The industrial schools are aiming, not merely at training students but at developing fresh industries and using new local materials.

With the growth of preparatory vocational education and, as we hope, the development of technical schools of the polytechnic type in India, the conditions will be materially altered and the control of technical education may then have to be transferred, as in other industrial countries, to the Department of Education. We believe, however, that at present the time is not ripe for this step to be taken."

#### APPENDIX VIII.

##### Replies from different firms regarding Provision of Facilities for Apprenticeship Training.

1. **The Card Board Box Manufacturing Co., 38, Colootola Street, Calcutta.**—Regret their inability to undertake training of apprentices as there is no such arrangement in their factory.

2. **The Banga Luxmi Soap Works, 4B, Council House Street, Calcutta.**—Are willing to co-operate but at the same time say that at present their business is too much handicapped to accommodate any apprentices.

3. **The Indian Machinery Co., Ltd., Dassnagar, Howrah.**—The firm quite appreciates the move for training the middle class youngmen who are willing to undergo apprenticeship in technical lines and is always agreeable to give all facilities for practical training to such young men, as available in its factory. The firm further intimates that it has already taken a band of literate youngmen for apprenticeship training and at the present moment accommodations are not available for more trainees. The firm, however, assures that it will willingly maintain apprentices in its workshops duly recommended by this Department when next opportunity occurs.

4. **Lever Brothers (India), Ltd., 63, Garden Reach, Calcutta.**—They inform that at present it is not their policy to engage apprentices but the matter referred to by this Department is under consideration.

5. **The Metal Box Co., of India, Ltd., B2, Hide Road, Kidderpore, Calcutta.**—The firm intimates that it has already adopted the system of apprenticeship and certain young men are taken periodically for training both in printing and manufacturing sides of the firm's business. The authorities of the firm assure that they would be quite willing to discuss any proposal that Government may have in contemplation before making arrangements for selecting possible trainees and they further point out that usually they require youngmen who have at least some ability or experience for engineering jobs.

6. **National Motor Services, 113, Park Street, Calcutta.**—The firm intimates that it would take only a limited number of apprentices, as it already has a number of them. But these apprentices will receive no remuneration until such time as they prove themselves useful, after which they will receive a small amount as pocket allowance.

7. **Jas. Alexander & Co., Ltd., 15, Watgunge Street, Kidderpore, Calcutta.**—The firm is agreeable to undertake to train a limited number of apprentices for training in electric and oxyacetylene welding, sheet metal work and machinshop work, but insists that the trainees will have to do practical work. The authorities complain that the attitude prevalent amongst the educated youngmen is that they do not care to soil their hands and prefer to give orders instead of working themselves.

8. **Burn & Co., Ltd., Howrah.**—The authorities intimate that they have a scheme of apprenticeship training in their workshop and usually have some thirty trainees going through a full course of five years' training in addition to students from the various colleges who attend for shorter periods. All these apprentices attend classes at the Calcutta Technical School for theoretical instructions. Besides, there is a scheme for the training of boys of lower educational standard as mechanics. This is at present largely in the experimental stage and is hampered due to difficulties in arranging for suitable classes. The authorities, however, hope to be able to develop this work in future. At the moment, there is no scope for taking in further apprentices.

9. **Bengal Waterproof Works, Ltd., Panihati, 24-Parganas.**—The firm has a number of apprentices under training and to avoid over crowding has stopped further recruitment for the present. But whenever opportunity be available the firm assures of its co-operation in the matter.

10. **The Britannia Engineering Co., Ltd., McLeod House, Calcutta.**—Regrets its inability to undertake practical training of young men as the firm is not in a position to make the special arrangements necessary for the instruction and supervision of such trainees.

11. **Steel Equipment and Construction, Ltd., 113, Benares Road, Howrah.**—The firm authorities intimate that they will earnestly co-operate with any scheme of apprenticeship training evolved by this Department. But at present their workshops are fully occupied. Nevertheless they assure of their future co-operation in the matter.

12. **Jenson and Nicholson (India), Ltd., 2, Fairlie Place, Calcutta.**—They have, for sometime past, been giving regular opportunities to educated young men of the middle class to gain technological experience in their factory and laboratories, with a view to their ultimate employment in executive positions. These trainees are not charged any fees and on the contrary they are paid monthly emoluments, though during the first year of training their work is of little productive value. The authorities of the firm complain that the educated youngmen appear to have a false notion of dignity and are generally unwilling to undertake any kind of manual labour. The dignity of labour needs, therefore, be emphasised upon such young men who should realise for themselves that one should have practical experience of the industrial operations which he hopes to control.

13. **The Calcutta Tramways Co., Ltd. (Power Station), 183, Lower Circular Road, Calcutta.**—The workshops of the firm provide for classes of apprenticeship training, viz, (A) for graduates and under-graduates, (B) for those who have passed the Admission Examination of the Board of Apprenticeship Training, and (C) for those who do not possess the required qualification for A and B class training. The period of training for B and C class apprentices is 5 years and the period for A class apprentices depends on special arrangements with individual colleges.

Allowances during apprenticeship are paid at the following rates —

**A Class.**

Rupees 22 per month during the whole period of apprenticeship

**B Class.**

During the 1st year of apprenticeship Rs. 12 per month  
 During the 2nd year of apprenticeship Rs. 15 per month  
 During the 3rd year of apprenticeship Rs. 19 per month  
 During the 4th year of apprenticeship Rs. 23 per month  
 During the 5th year of apprenticeship Rs. 26 per month

**C Class.**

During the 1st year of apprenticeship Rs. 12 per month  
 During the 2nd year of apprenticeship Rs. 14 per month  
 During the 3rd year of apprenticeship Rs. 16 per month  
 During the 4th year of apprenticeship Rs. 18 per month.  
 During the 5th year of apprenticeship Rs. 20 per month

The number of apprentices taken by the Company at any one time is limited to 10 in the A Class, 20 in the B Class and 30 in the C Class. In this connection the authorities further inform that every year they receive many times the number of application than there are possible vacancies.

14. **Bengal Electrical Lamp Works, Ltd., 126, Mollapara Road, 24-Parganas (Jadavpur).**—Informs that in the factory of the firm every year as many passed students of the College of Engineering and Technology (Jadavpur) as possible are being accommodated.

15. **Hukumchand Electric Steel Co., Ltd., 8, Swinhoe Street, Calcutta.**—The firm has been training apprentices in Mechanical Engineering and in the manufacture of steel castings. The number of apprentices under training at any one time is limited to nine and any increase in the number is not permissible. All such apprentices have to take their theoretical lessons at the Calcutta Technical School. The firm authorities are, however, prepared to consider the admissibility of any candidate recommended by this Department, but admission can only be given when vacancies occur.

The rules of apprenticeship training are as follows:—

(a) Applicants for apprenticeship must have passed the Matriculation Examination or the Admission Examination of the Board of Apprenticeship Training before they can be admitted.

(b) New apprentices will be on probation for a period of 3 months and will be retained for the full course of apprenticeship, if they show sufficient aptitude and keenness to learn.

(c) The period of training will be for 3 years consisting of:—

- One year in the Pattern Shop,
- One year in Machine Shop;
- One year in Foundry and Fitting Shop.

(d) The probationary period will be served without pay, but on entering training proper apprentices will be paid —

- Rs 15 per month for 1st year
- Rs 20 per month for 2nd year
- Rs. 25 per month for 3rd year.

16 **The Calcutta Electric Supply Corporation, Ltd., Victoria House, Calcutta.**—There are three classes of apprentices, viz., (A) Students, (B) Workshop apprentices, and (C) Engineering apprentices now under training at the workshops of the firm.

(A) The student apprentices have to complete a course of one year training and no remuneration is paid to them.

(B) The workshop apprentices are selected from such candidates as have passed the High School Examination and their training covers a period of 4 years at the following rates of pay—

- Rs. 16 per month during 1st year
- Rs 19 per month during 2nd year.
- Rs 22 per month during 3rd year.
- Rs 25 per month during 4th year.

(C) Engineering apprentices are selected from such candidates as have passed the Board of Apprenticeship Training Examination or I Sc or B Sc Examinations. The course of training covers five years in various departments of the Company at the following rates of pay —

- Rs 20 per month during the 1st year
- Rs. 25 per month during the 2nd year.
- Rs 30 per month during the 3rd year.
- Rs. 35 per month during the 4th year
- Rs 40 per month during the 5th year.

The authorities, however, inform that at present they have a full number of apprentices and in view of the numerous applicants on the waiting list, there will be no vacancies for some considerable time

17. **G. McKenzie & Co., Ltd., 208, Lower Circular Road, Calcutta.**—For some time the firm has been taking apprentices for training, but all such apprentices are required to deposit a security of Rs 100 as a token of good faith and the said amount is refunded on the satisfactory completion of 3 years' training. The authorities are of opinion that there is a good opening for educated Bengali youths in the Motor trade and they will be pleased to receive any candidate recommended by the Department. But they complain that in majority of cases Bengali youths are found to be more interested in clerical jobs than in practical jobs and as such the authorities solicit this Department's help in securing a better class of workers.

18 **The Indo-British Motor Industry, 57, Dharamtala Street, Calcutta.**—The firm can accommodate only 2 or 3 educated youths as unpaid apprentices in its workshop. But the authorities intimate that their workshop is small and suffers for slackness in trade during the major part of the year.

19 **India Rubber Industries, Ltd., 57, Diamond Harbour Road, Kidderpore.**—The firm can take in at least 10 suitable apprentices, without any stipend during the training period but to be paid later at the rate of Rs 20 to 35 according to ability. The authorities complain that the educated Bengali youths generally do not like the idea of receiving instructions from illiterate mistries, which they have often to do while undergoing any workshop training

20 **Gun and Shell Factory, Cossipore, 24-Parganas.**—The Superintendent, Gun and Shell Factory, Cossipore, informs that only such candidates as are selected by the Federal Public Service Commission or by the Ordnance Factories can be accepted for apprenticeship training

21. **The Britannia Biscuit Co., Ltd., 5-1, Mangoe Lane, Calcutta.**—The Company states that the industry is highly technical and efficient training of apprentices would not be possible as that would mean divulging of trade secrets. The firm may, however, take such apprentices as can be permanently employed in its own factory.

22. **Diana Engineering Co., 31, Clive Street, Calcutta.**—The authorities of the firm state that their works are more of the nature of a home industry than a big concern and as such there is hardly any opportunity for training of apprentices

23. **Burmah Shell Oil Storage and Distributing Co., of India, Ltd., Budge Budge, Calcutta.**—The authorities of the firm intimate that the subject under reference is being discussed with their Branch Office who will reply in due course.

24. **Macfarlane & Co., Ltd., 18, Tangra Road, Entally, Calcutta.**—The Company informs that it has opening for two apprentices only and two are already working there.



Moreover they have a long list of applicants for the same and as such there is hardly any room for new recruitment just at the moment. Nevertheless that authorities assure that they are doing their best in the matter.

**25 Metal and Steel Factory, Ishapore, 24-Parganas.**—The Superintendent informs that the position with regard to this factory and the Ordnance Factories in the neighbourhood in general is as follows:—

(a) Proper apprentices are recruited only under certain conditions definitely laid down by the Central Government of India through the Central Public Service Commission,

(b) It is clearly to the interest of the State that apprentices selected should not be confined to any particular province,

(c) With regard to trade lads, these are always recruited, as far as possible from the sons of the workmen under employment of the factory. Apprentices of this class are taken to the limit of the absorptive capacity of the factory, provided they are of a definite standard of age and education.

The Superintendent, however, is of opinion that it would be completely unfair to substitute these lads whose fathers have served in the factory and whose aptitude and ambitions in life are directed towards the factories where their fathers have served, by "bhadralogs" or others taken from the province in general. Under circumstances the local Ordnance factories are not in a position to render much help.

**26. The Calcutta Chemical Co., Ltd., Panditia, Ballygunge, Calcutta.**—The firm is ready to co-operate in any scheme of apprenticeship training and wants to be informed of the details of any proposal on the point that might be in view of the Government.

**27. Caltex (India), Limited, United India Life Building, P.O. Box 2382, Calcutta.**—The firm is willing to co-operate with Government in the matter, but informs that at present there is hardly any room for taking in new apprentices.

**28. The Bengal Iron Works, 16/2, Chatterjeepara Lane, Bantra (Howrah).**—This Company offers to co-operate in the matter and is ready to take in suitable candidates for training in the moulding and fitting shops in its factory.

**29. The Mackintosh Burn, Ltd., 8, Clive Street, Calcutta.**—The authorities intimate their willingness to co-operate and suggest that a representative of the Department should see the Director of the firm and discuss practical propositions.

**30. Ford Motor Company of India, 2, Justice Chandra Madhab Road, Calcutta.**—The authorities are ready to discuss practical proposals with a representative of the Government before which they are not inclined to commit themselves.

**31 Maya Engineering Works, 36A, Russa Road, Kalighat, Calcutta.**—The firm assures its co-operation. The authorities, however, inform that at present preparations are being made for shifting the factory to a new site and as such it will not be possible to take in apprentices till the end of this year.

**32 Britannia Building and Iron Co., Ltd., 100, Clive Street, Calcutta.**—The firm generally accommodates two passed students from each of the Bengal Engineering College, and the Ahsanullah School of Engineering, Dacca, for one year's course of practical training in Civil and Structural Engineering. Two more apprentices may be accommodated for training in fabrication of structural steel work and carpentry, but such candidates should possess elementary knowledge of civil engineering and should be capable of reading drawings. Generally the apprentices are paid no remuneration unless they prove useful.

**33 Dunlop Rubber Co. (India), Ltd., Shahaganj, Hooghly.**—In the factory of this firm there is no apprenticeship system. The authorities are, however, inclined to consider the possibility of appointing candidates recommended by us on suitable vacancies.

**34 The Titaghur Paper Mills, Co., Ltd., Chartered Bank Buildings, Calcutta.**—The authorities intimate that there is no arrangement for training of apprentices except for those who might possibly be appointed in the factory of the firm. At present, however, there is no vacancy.

**35 Jessop & Co., Ltd., 93, Clive Street, Calcutta.**—The firm provides for three classes of apprenticeship training in its factories, namely, (a) Drawing Office apprentices, (b) Indentured apprentices and (c) Workshop apprentices. Young men with a degree or diploma from a recognised technical university, institute or college are admitted to a three years' course of training in the (a) class apprenticeship. They are paid an allowance of—

- Rs. 30 per month in the 1st year
- Rs. 40 per month in the 2nd year
- \* Rs. 80 per month in the 3rd year

Candidates with a sound general education and not above 17 years of age are admitted to a course of six years' training in (b) class apprenticeship. All such apprentices have to attend theoretical classes at the Night School provided by the Board of Apprenticeship Training. They are required to furnish a bond of Rs. 100 on being indentured. Usually small allowances are paid to these apprentices in addition to their Night School fees. (c) Workshop apprentices are recruited from young men between 16 and 19 years

of age but with a lower standard of education. They are given three years' exclusively practical training in any one particular trade and during this period allowances are paid at the rate of annas 8, 9 and 10 per diem in the 1st, 2nd and 3rd year.

The authorities of the firm assure their full co-operation in the matter and suggest that for the present one nomination each year to anyone of the apprenticeship grades may be placed at the disposal of this Department.

36 **Burmah-Shell Oil Storage and Distributing Co. of India, Ltd., Hongkong House, Dalhousie Square, Calcutta.**—The firm intimates that in its workshop a small number of apprentices are always trained in the manufacture of dies and insets for tin-making machineries. But in such recruitments preference is always given to the wards of the existing employees and the number of apprentices is limited to the possible vacancies. Under the circumstances, there is little scope for training of outside apprentices.

37. **J. B. Norton & Sons, Ltd., Norton Buildings, Calcutta.**—Apprentices are recruited for training in plumbing works, with a view to turn out supervisors and foremen. The scope and opportunities being limited, not more than six apprentices can be accommodated in the factory at a time.

#### APPENDIX IX.

#### Resumé of the Recommendations of the Technical Education Sub-Committee on training of Cottage Industry Workers.

Demonstration Parties as itinerant training institutions are admirably suited for the training of cottage industry workers scattered all over the province. These Parties constitute an ideal agency for the training of cottage workers particularly in the matter of the demonstration of the actual results obtained from research and experiments in improved processes of manufacturing cottage products. In the initiation of improvements and also new profitable lines of cottage industries it is of the great importance that the methods of training given by the Demonstration Parties should be devised on the following lines so as to be of real advantage to the cottage workers.

##### (1) Metal Casting (Brass and Bell-metal Parties).

(i) These Parties should devote themselves entirely to the training of the traditional cottage workers engaged in the manufacture of brass and bell-metal wares, and in the methods of their training special attention should be given to the particular types of wares which have the largest market and also to the processes to which cottage workers are accustomed.

(ii) The term of these Parties should be extended by five years on the definite condition that in the course of this period they must cover all the important centres of the industry in this province, if the results of working during these five years justify the retention of the Parties, they may ultimately be made permanent for the propagation of further improvements.

(iii) The manufacture of special wares as office and drawing room requisites may with best advantage be taught in trade classes organized in suitable technical schools.

##### (2) Cutlery Parties.

(i) Possibility of the replacement of certain cheaper varieties of imported agricultural implements by training of village blacksmiths in improved methods for which services of Demonstration Parties are called for.

(ii) For manufacturing such articles as tea garden implements, scissors, locks, etc., a higher standard of training in technical schools suitable for Bhadralog class young men is necessary.

(iii) The Cutlery Demonstration Parties should be given an extension of term of five years, and if the results of their working during this period justify their retention, these Parties may be made permanent.

##### (3) Umbrella Parties.

Prospects of small independent factories being started and successfully run by those trained by Umbrella Demonstration Parties, as contemplated in the Unemployment Relief Scheme, appear to be limited. It is to be considered as to whether and to what extent the training given by such Parties can be helpful to the trainees in securing employment in umbrella factories and also whether the trainees can be established in independent business on small scale through effective measures of reorganization.

##### (4) Soap Parties.

(i) Manufacture of washing soap is practically concentrated in two zones, viz., (a) Calcutta and Howrah, and (b) Dacca and Narayanganj.

(ii) The potentiality of the expansion of this industry in other new centres is limited on account of its dependence on imported materials.

(iii) In the two important zones the best arrangement for giving necessary training would be to organize trade classes in selected technical schools, pending the organization of such trade classes the operations of the Soap Demonstration Parties should be concentrated in the two principal zones.

(iv) If the prospects of the industry at Chittagong are found on investigation to offer scope for profitable expansion a Demonstration Party may be stationed there.

**(5) Jute and Wool Weaving Parties.****(A) Jute—**

- (i) Potentiality of the development of jute weaving as a cottage industry appears to be promising. There is need for Demonstration Parties for its development  
 (ii) The continuance of the Demonstration Parties is approved but their present methods of training should be modified so as to include both spinning and weaving

**(B) Wool—**

- (i) Potentiality of the industry in Bengal is not very extensive  
 (ii) The Demonstration Parties should be retained but they should give special attention to the problem of sustaining the newly developed blanket-weaving industry in Bengal after the War

**(6) Boot and Shoe-making Parties.**

- (i) The training of Bhadralog class young men by such Parties is useful  
 (ii) Potentialities in respect of the training of Chamars and Muchis by such Parties are to be fully explored  
 (iii) Establishment of Leather Trade Schools will not dispense with the necessity of Demonstration Parties for training Muchis and Chamars.  
 (iv) Boot and Shoe-making Parties should be continued but in future their primary concern should be to train traditional Muchis and Chamars

**(7) Pottery and Coir.**

- (i) Potentialities of these industries are promising  
 (ii) There is a need for the development of these industries on a factory-cum-cottage basis and associating Demonstration Parties with the factories for training of cottage workers  
 (iii) Government should initiate measures for introducing private enterprises to start factories on these lines in different parts of the province  
 (iv) The activities of Coir Demonstration Parties should for some time be confined to Uluberia where a factory has been set up and which can be served by one Demonstration Party—the number of such Parties to be increased in respect of other promising areas as and when similar factories are established in such places  
 (v) The proposed organization of Coir and Pottery industries on a factory-cum-cottage basis will require the support of Bhadralog class young men taking the initiative in the organization of factories  
 (vi) In respect of the Coir Industry Bhadralog class young men are to be trained in the demonstration factory assisted by Government, as for Pottery, Bhadralog class young men will require higher technical training in an institution like the proposed Ceramic Institute  
 (vii) In both cases of Pottery and Coir Industries the responsibility of giving training to cottage workers will devolve mainly on Demonstration Parties

**(8) Other Demonstration Parties.**

Organization of Demonstration Parties other than those set up—

**(A) Textile**

- (i) There is no practical difference between methods of Peripatetic Weaving Schools and Textile Demonstration Parties  
 (ii) Dyeing as a part of the course of training should be introduced  
 (iii) In view of the importance and extent of the handloom industry and its urgency for catering to the changing tastes of consumers, the Textile Demonstration Parties should be continued with necessary modifications in their methods from time to time according to the changing needs of the industry  
 (iv) The distinction between Peripatetic Weaving Schools and Textile Demonstration Parties should be abolished  
 (v) The number of Demonstration Parties including the Peripatetic Schools should be increased for the present to 50  
 (vi) The Services of Textile Demonstration Parties should be confined to the rural weaving community including caste weavers and also those of the agricultural class to whom handloom weaving may provide a profitable part-time occupation  
 (vii) Young men of the Bhadralog class who may be attracted to this line either for starting small factories or for employment in cotton mills should be trained either at the Serampore Textile Institute or at the District Weaving Schools  
 (viii) Dyeing as a part of the course of training has its limitations for it may not be afforded unless it is undertaken as a combined enterprise by groups of weavers  
 (ix) The Serampore Textile Institute should provide guidance in the matter of designs and other technical improvements  
 (x) Training in the use of jacquard looms should be abolished except in areas where weavers have necessary resources for taking advantage of the training  
 (xi) The period of training given by the Demonstration Parties should be fixed at 6 months as it should suffice for traditional cottage weavers and also the agriculturists interested in the manufacture of simpler types of cotton fabrics  
 (xii) The Textile Demonstration Parties should follow the method of training weavers in their own homes

**(B) Tanning**

- (i) Tanning factories are of the nature of capitalistic enterprise for which Bhadralog class young men alone can be given a useful training

(ii) Training for such young men can with best advantage be given by the Bengal Tanning Institute. If half tanning industry can be developed on a cottage basis in different rural centres of Bengal, the services of Tanning Demonstration Parties would be urgently called for to give necessary training to the Muchi and Chamar population, although at the initial stages their operations might have to be confined to areas in the neighbourhood of Calcutta.

The Demonstration Parties, which are proposed to be retained, should, wherever necessary, be made to undergo a course of special training in order to acquaint themselves with real problems and difficulties of cottage workers.

There is need for continuous research and experiments and guidance to Demonstration Parties through such institutions as the Bengal Tanning Institute, the Bengal Textile Institute, Industrial Research Laboratory, etc.

#### APPENDIX X.

#### List of Persons, Institutions and Firms to whom Questionnaires were issued by the Committee.

##### (A) Bengal.

- 1 Bengal Chamber of Commerce, Calcutta.
- 2 Bengal National Chamber of Commerce, Calcutta
- 3 Indian Chamber of Commerce, Calcutta.
4. Muslim Chamber of Commerce, Calcutta.
- 5 Marwari Chamber of Commerce.
- 6 Bengal Mahajan Sabha
7. Director of Industries, Bengal.
8. Principal, Government School of Arts, Calcutta.
9. Principal, Government Commercial Institute, Calcutta
10. Principal, Bengal Engineering College, Sibpur.
- 11 Principal, Calcutta Technical School
12. Superintendent, Jadavpur College of Engineering and Technology.
- 13 Superintendent, Calcutta College of Engineering and Technology
- 14 Superintendent, Saroj Nalini Memorial School
15. Superintendent, Deaf and Dumb School.
16. Superintendent, Home Industries Association
- 17 Principal, Serampore Textile Institute
- 18 Superintendent, Bengal Tanning Institute
19. Manager, Santineketan Institute, Bolpur
- 20 Head Master, The India Industrial Mission, Cossipore
- 21 Secretary, Loreto Convent Industrial School, Magrahat.
- 22 Superintendent, B G Technical School, Rangpur
23. Superintendent, E B Technical School, Pabna
- 24 Superintendent, Government Technical School, Barisal.
- 25 Headmaster, Santipur Weaving School
- 26 Headmaster, Bengal Survey School, Comilla
27. Headmaster, Edward Industrial School, Bogra
28. Headmaster, District Weaving School, Dacca.
29. Headmaster, District Weaving School, Pabna
30. Headmaster, District Weaving School, Malda
31. Headmaster, District Weaving School, Tangail.
32. Headmaster, District Weaving School, Khulna
33. Headmaster, District Weaving School, Bankura
- 34 Headmaster, District Weaving School, Sui
- 35 Headmaster, District Weaving School, Begamganj.
36. Headmaster, District Weaving School, Zorwanganj
- 37 Principal, Silk Technological Institute, Berhampore.
- 38 Head Master, Bishnupur Industrial School
- 39 Deputy Director of Sericulture, Berhampore
40. Mr. J A Murrari, Messrs Jardine & Co, Calcutta
41. Mr H A Gibson, Indian Engineering Association
42. Industrial Deputy Magistrate in different districts
43. Headmaster, Kanchrapara Technical School
- 44 District Board Technical School, Burdwan.
45. Moberly Technical School, Hooghly.
- 46 Ishapur Technical School.
47. Bipradas Pal Chowdhury Technical School, Krishnagore.
- 48 Midnapore Weaving School
- 49 Mograhat Weaving School
50. Ramkrishna Mission Industrial School
51. Baranagore Mission Industrial School
52. Morapal Mission Industrial School
53. Vidyasagar Banibhaban
- 54 Indian Bakery and Confectionery College, Bhowanipur.
- 55 Maharaja Cossimbazar Polytechnic Institute
- 56 Anandapur Weaving Demonstration Party.

57. Uluberia Coir Demonstration Party
58. Bata Shoe Company, Ltd, Batanagar.
59. Macfarlane & Co., Ltd, Calcutta
60. Calcutta Electric Supply Corporation, Ltd.
61. The Metal Box Company of India, Calcutta
62. Association of Paint, Colour and Varnish Manufacturers in India.
63. Alluminium Manufacturing Co, Ltd
64. Calcutta Tramways Co, Ltd
65. Birkmyre Brothers
66. Babulal & Co, Ltd
67. Octavius Steel & Co
68. The Oriental Gas Co, Ltd.
69. Andrew Yule & Co., Ltd
70. Roberts, McLeane & Co., Ltd.
71. Martin & Haris, Ltd.
72. William Jacks & Company, Ltd.
73. Birla Jute Manufacturing Company.
74. Shimock & Brothers (Calcutta), Ltd
75. The Imperial Tobacco Co, Ltd.
76. The Indian Rubber Manufacturers, Ltd.
77. Shalmar Works, Ltd.
78. Clive Mills Company, Ltd
79. McLeod & Co., Ltd
80. Burmah Shell.
81. Shaw Wallace & Co
82. British Insulated Cables, Ltd
83. The Tata Iron & Steel Co., Ltd.
84. Associated Electrical Industries (India), Ltd
85. Mackintosh Burn, Ltd
86. A & J Mann & Co., Ltd
87. The Titaghur Paper Mills Company, Ltd.
88. The Electric Supply Company of Burdwan, Ltd
89. Kushumika Iron Works, Ltd
90. Adamjee Jute Mills, Ltd
91. Sarda Tea Co, Ltd
92. Comilla Electric Supply, Ltd
93. Messrs Abdool Razak Hajee Abdool Suttar, 32, Ezra Street, Calcutta
94. Messrs. Abdul Rahim Osman & Co. (India), Ltd, 2, Rajmohan Street, Calcutta
95. Messrs Adamjee Jute Mills, Ltd, 5, Dalhousie Square, Stephen House, Calcutta
96. Messrs The Bengal Silk Mills Co, Ltd, 13, Ariff Road, Ultadanga, Calcutta.
97. Messrs Dost Mohamed & Co, Ltd, 19, Zakariah Street, Calcutta.
98. Messrs. Gordon & Co, 106, Narkeldanga Main Road, Calcutta.
99. Messrs Hajee Ismail Sait & Sons, Ltd, Russa Distillery, Tollygunge, Calcutta
100. Messrs M. M. Isphani, Ltd, 61, Ezra Street, Calcutta.
101. Messrs The Bharat Laboratory & Chemical Works, Ltd, 10, Prince Anwarshah Road, Calcutta
102. Messrs C A Mohammad, 15, Synagogue Street, Calcutta.
103. Glenfield & Kennedy, Ltd, Calcutta.
104. Gopalpur Tea Co., Ltd., Jalpaiguri
105. Jost's Engineering Co, Ltd
106. Kamala Mills, Ltd
107. Louis Dreyfus & Co.
108. D Sassoon and Co, Ltd.
109. The Banga Luxmi Soap Works.
110. The Basanti Cotton Mills, Ltd
111. The Bengal Chemical and Pharmaceutical Works, Ltd.
112. The Bengal Glass Manufacturers' Association.
113. The Dhakeswari Cotton Mills, Ltd.

**(B) In other Provinces.**

1. Mr. John Sergeant, Educational Adviser to the Government of India.
2. U. P. Government Handloom Emporium, Lucknow.
3. Government School of Arts and Crafts, Lucknow
4. U P. Arts and Crafts Emporium, Lucknow
5. Government Central Textile Institute, Cawnpore
6. Government of India, Delhi Polytechnic.
7. Dayalbag Industries, Dayalbagh, Agra
8. Barelilly Wood Working Institute.
9. Dehra Dun Forest Research Institute
10. Bombay Victoria Jubilee Institute
11. Department of Chemical Technology, Bombay University
12. Research Laboratories of the Indian Central Cotton Committee, Bombay.
13. Hartcourt Butler Technological Institute, Cawnpore.
14. Central Textile Institute, Benares
15. The Cottage Industries Institute, Patna