Educational (1899) Department.

ORDINARY PRINTED.

G.O., Nos 504, 505

DATED 5-8-99

L. & F

86-88

[Despatch Abstract.]

Technical trades & industries. Stating that the Govt. of India will be addressed on the subject of the development and encouragement of ——.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
	N° 1 of 1899						

Government {1899} of Madras.

EDUCATIONAL.

—o—

Recd. } 1899. *Enclosures*

Regd. *Spare copies*

G. O., &c., Nos. 504, 505, 5th August 1899.

N. P.

AUGUST.

Technical trades and industries.

Stating that the Government of India will be addressed on the subject of the development and encouragement of——.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

Read—the following papers:—

From the Hon'ble Mr. D. DUNCAN, M.A., D.Sc., LL.D., Director of Public Instruction, Madras, to the Secretary to Government, Educational Department, dated 1st June 1897, No. 5851.

G. O., No. 1252, Financial, dated 20th December 1898.

From the Hon'ble Mr. G. H. STUART, M.A., Acting Director of Public Instruction, Madras, to the Secretary to Government, Educational Department, dated 17th April 1899, No. 4437.

From the same officer, dated 22nd April 1899, No. 4671.

Memorandum by Mr. CHATTERTON on the Aluminium industry at the School of Arts, Madras.

1. Was started at the end of March 1898 and the sales during the first seven months amounted to Rs. 21,000 or an average of Rs. 3,000 a month. Approximately the value of the raw material used may be assumed to be one half the selling value.

2. The commoner work such as degshais can be made by any fairly skilled copper smith, but owing to the fact that no solder is ever used complicated forms require more skill than is necessary when a metal which can be brazed is employed.

3. Casting, turning, polishing and finishing off require more skill than the ordinary bazaar workmen generally possess and they require training before they can turn out successful work in aluminium.

4. The School of Arts has done everything possible to induce private people to set up workshops for the production of aluminium vessels, but so far only two firms in Madras have made any attempt, one with very little success, but the other with results at present unknown, except that they have so far purchased 15 cwt. of metal and have advertised a great deal.

5. Since the School of Arts commenced work, it has been started in the Madura Technical Institute and at the Bombay Victoria Jubilee Technical Institute on a fairly large scale with the very complete plant of English Metal working machinery, which was installed there some years ago and which formerly turned out brass bowls, tumblers, dishes, &c. Aluminium working was started there in consequence of the success achieved in Madras.

6. Small quantities of metal have been supplied to a number of industrial schools and private people, but so far nothing tangible has been the outcome of any experiments they have made.

7. The object of the School of Arts has been to pay all expenses and to devote profits made to experiments with a view to developing further uses for the metal, and so far it is thought that these ends have been achieved.

8. At present, to make the business pay, it is absolutely necessary to melt down all the scrap from the sheets used in hammered work and to cast them into forms which are saleable.

9. So far the only commercial result of the working of the School of Arts has been to stop the importation of English and German manufactured goods. Nearly every kind of work can be done in Madras by hand labour at rates considerably below those for imported work, and for practical purposes the work is stronger and more durable, though not quite so well finished.

10. All the men employed in the School of Arts are copper and brass smiths by trade and they can make, at present, much better wages than they formerly did. Any extension of the business of the School will necessitate the employment and training of more men.

11. The system of working at the School of Arts is highly favourable to the workmen as they get better pay, more skilled work and are provided with excellent workshops and proper tools. Some are paid by piece work and some by daily wages.

12. Constant applications for employment are being made and a large number of workmen have been trained in the school and are undoubtedly the better for it.

13. So far only native tools and methods of working have been in use, such modifications being made from time to time as experience showed were improvements, and all these changes are, what may be termed, natural evolutions of native methods of working.

14. Experiments have been made with European methods of work, but for a variety of reasons they have not been extensively adopted.

15. Our principal customers are Messrs. Spencer & Co., Madras, Messrs. Barnett Brothers, Rangoon, Messrs. Pearson & Co., Secunderabad and Messrs. Rutnagur & Co., Bombay, and there is no doubt that, if the advantages of the wares of the School of Arts were properly brought to the notice of similar firms in Calcutta, Benares, Allahabad, Lucknow, Delhi and other great northern towns, a large wholesale business could be developed. Price lists have been issued and the firms who act as agents get a discount of 15 per cent. on articles entered in the lists and special net terms on special orders.

16. The profit on hammered work, which is nearly all made on the piece work system, is considerale, but the system of accounts is not accurate enough to enable the profit on cast and fitting work to be determined.

17. A good deal of ornamental work has been made and most of it sold and the prospect of finding employment for a large number of art metal workers seems good.

18. One is bound to recognize that in a Government industrial school a permanent commercial undertaking is not possible, but it does seem desirable in the public interests that the School of Arts should continue working on the present lines for some considerable time to come. Briefly stated, some of the reasons why Government should take an active part in introducing the metal into India are,

(*a*) the metal can ultimately be manufactured in India and will take the place of imported brass and copper to the manifest advantage of the country,

(*b*) on sanitary and hygienic grounds its use should be encouraged,

(*c*) at a distant date the requirements of Government for military equipment, for abkari, for hospitals and jails and for many miscellaneous purposes will be extremely large,

(*d*) the field for employment of aluminium in India is so enormous that one Government factory could find plenty of work without appreciably affecting the prospects of other pioneers, and

(*e*) the Madras metal workers are probably unequalled in India, and the School of Arts whilst working on a large scale will be able to give them many facilities for acquiring increased skill and experiences, which will enable them in the future to send their productions to a much greater distance than they can now do.

19. It is equally obvious that no Government educational institution can ever expect to turn out work as cheaply as private firms, and it is, therefore, only under very exceptional circumstances that any manufacturing operation can be carried on at a profit or even without a large loss. This is borne out by the past history of the School of Arts which has never made a profit on its outturn of work. Quite properly the proceeds from sales have been looked upon as a source of income to help to diminish the net cost of the School, but have never been regarded as being capable of expansion to any large extent without a corresponding increase in the gross outlay. If, therefore, aluminium manufactures can be carried on at the School without loss or with only a small loss, it is because there is no effective outside competition, and it seems desirable from a public point of view to extend operations as much as possible so long as no serious loss is incurred. By so doing outside competition will be more effectively stimulated and the use of aluminium more rapidly extended. It therefore seems reasonable to develop the Aluminium Department of the School so long as it costs the State no more than can be legitimately charged to the educational work which it performs.

20. It must be remembered that the Aluminium Department competes with no previously existing trade in India and interferes with no vested interests as it was absolutely the pioneer in this branch of work in this country. So far as the Madras Presidency is concerned, it has given employment to Madras metal workers and their wares have been sent all over India and Burma, and as regards the whole of India it has displaced a certain amount of European manufactured ware and presumably a large amount of foreign imported copper. So far as the Indian Empire is concerned, its action has been distinctly beneficial, so far as the British Empire is concerned, it has displaced a certain amount of foreign copper by British made aluminium. Of course this has all been done on a very insignificant scale, but it is necessary to clearly bear in mind that in a minute way it all helps to the development of the industries of both India and England, and its encouragement therefore is desirable. In years to come, the Indian aluminium industry promises to be of considerable commercial importance, and the exceptional circumstances attending its birth render it possible for Government to carry on the work for some time longer and it seems reasonable to fix the duration of the period of active Government participation in the trade to the period during which it involves the State in no commercial loss.

21. Industrial operations on a large scale usually involve the expenditure of large sums in capital outlay on buildings and plant, but the method of working at the School of Arts has been such as to avoid this and there is absolutely no reason why the trade should not be indefinitely extended by simple multiplication of existing arrangements. For some reasons, all purely educational, it would be desirable to set up a certain amount of modern machinery, but this is a question which must be discussed sooner or later quite apart from aluminium, if it is desired

that the Madras metal workers should not fall out of line with the progress in industrial methods which is generally being made all over India.

22. There is not the slightest doubt that if the aluminium business of the School of Arts were placed in private hands to be run as a private concern, it could with adequate capital be developed into an immense and profitable commercial undertaking. A trade connection has been formed, a name has been gained all over India and a fund of experience formed of considerable commercial value. In fact, judged as a private concern, a valuable goodwill has been created and for a time at any rate the public should enjoy it. Gradually as competition sets up, the value of the goodwill will depreciate and when it has disappeared no one will be the worse if the School ceases to turn out aluminium wares. At the present time the School controls the prices of aluminium wares all over India and so long that it can do that, it is doing a useful public work. How long it will continue to do so will depend on the skill and enterprize shown in its management, but there is no doubt that, the longer it can do so, the more firmly will be established the new trade and the sooner will it be possible to take steps to manufacture the metal out here with energy derived from water power.

Order—No. 504, dated 5th August 1899.

The Government of India will be addressed.

(True extract.)

M. HAMMICK,
Ag. Secretary to Government.

To
The Director of Public Instruction.

Letter—No. 505, Educational, dated Ootacamund, 5th August 1899, to the Secretary to the Government of India, Home Department.

I am directed to address you on the subject of the development and encouragement of technical trades and industries in Madras, which has for a considerable time past been occupying the attention of this Government.

2. The desirability of encouraging technical education and the necessity of improvement in the matter of technical and industrial training may be said to have been first prominently brought to the notice of Local Governments by the Resolution of the Government of India, Home Department, No. 10—309, dated 23rd October 1884, and the subject has from that date frequently been under the consideration of this Government. The first steps taken in this Presidency in accordance with the suggestions of the Government of India to establish and extend a system of technical and industrial training are to be found in the scheme of technical examinations which was submitted by Mr. Grigg, then Director of Public Instruction, in 1885. In organizing the development of a system of technical education, Mr. Grigg, profiting by the experience of other countries, proposed, to quote his own words, "to try the stimulating effect of a scheme of examinations, supplemented by a system of liberal grants-in-aid, making at the same time provision for the supply, so urgently needed, of well-instructed and professionally trained teachers." He further proposed that steps should be "taken to develop the scientific and art institutions now existing at the Presidency, so as to make them not only teach all or most of the sciences and arts of which need is at present felt, but also serve for the provision of a supply of science and art teachers and as models for private effort." The notification and syllabuses relating to these examinations were finally approved by Government in G. O.

No. 198, Educational, dated 31st March 1886, and since that date have been periodically revised. The examinations are now regulated by notification No. 18 of the 25th January 1893, their object being as stated in the notification, to encourage scientific and technical instruction with special reference to manufactures and industries and generally to the necessities of the practical side of life. These examinations include three grades, advanced, intermediate and elementary, and embrace as many as eighty-nine different subjects ranging from bread-making and needlework to veterinary science and electro-metallurgy.

3. Whilst adopting this scheme of examinations for the development of technical education this Government at the same time recognized the necessity of providing for systematic instruction in certain subjects by special Government institutions, *e.g.*, in civil engineering by the Engineering College, in biology and sanitary science by the Medical College, in agriculture by the Agricultural College and in drawing by the School of Arts, while grants-in-aid were made towards technical, industrial or art schools established in the Presidency by private agency, the total number of which at the end of 1897-98 was 37 attended by 2,743 pupils. For a more detailed account of the work carried out by the Educational Department in regard to industrial and technical schools during the last few years, I am to refer you to the chapters on Special Education in the reports on Public Instruction for 1897-98 and for the quinquennium 1892-93 to 1896-97.

4. His Excellency the Governor in Council, however, recognizes that the efforts hitherto made in the direction indicated in the preceding paragraphs of this letter have not been commensurate with the magnitude and importance of the subject, that few measures have been adopted calculated to affect the class of artisans, except the establishment of a few carpentry classes in different parts of the country, and that little or nothing has been done in the direction of developing any enterprize—whether industrial or commercial—which would be likely to afford the prospect of employment to a considerable number of the working classes. The criticism levelled against Mr. Grigg's scheme of technical education that it was merely a scheme of examinations and nothing more may not have been wholly deserved, but this Government recognizes that the system of examinations is professional and theoretical rather than practical and leaves the development of the artisan and his industries untouched. It is pertinent to this aspect of the subject to quote the following extract from Sir Alfred Croft's Review of Education in India in 1886. In speaking of general schemes of Technical Instruction in paragraph 228 he said "· · · · it is abundantly clear that technical education will not create trades; except in a few well-defined instances, it must follow in the wake of trades already established. Nor, when the trades exist, will technical education by itself create skilled artisans. The artisans must learn their trade independently; and the office of technical instruction is to make them more capable and skilful workmen, either by teaching them improved processes in the art which they already practise, or by educating the hand and eye in drawing, modelling, and the use of tools of precision, or by instructing the students in those branches of mathematics or science or technology with which their art is directly concerned. The exceptions to the rule are found in those cases in which the appliances of the art are so compact and handy that the school is itself the factory: such are the trades of wood-engraving, wood-carving, metal-chasing and similar applications of Fine Art to industry. The School of Art may thus be made, as it has been made, the means not only of improving existing trades but of introducing them into places where they are as yet unknown." The possibility of the introduction of a hitherto unknown industry through the medium of the School of Arts, referred to in the latter portion of Sir Alfred Croft's remarks, which were made more than ten years ago, has, I am to say, been recently exemplified in a remarkable manner in the School of Arts, Madras, by the introduction of the aluminium industry by Mr. A. Chatterton, B.Sc., of the Indian Educational service. The circumstances under which this industry has been introduced are briefly detailed below.

5. At the end of 1897 with the idea of introducing the working of aluminium as a technical industry Mr. Chatterton brought out some aluminium from England, and after experimenting with it in the School of Arts ordered at his own risk a ton of the metal to be sent out to Madras. With this material the aluminium industry was started under Mr. Chatterton's superintendence, and this Government in January 1898 accorded its sanction to an expenditure of Rs. 1,500 on the manufacture of aluminium vessels in the School of Arts as an experimental measure. In March 1898 a further allotment of Rs. 2,300 was made towards the industry, and up to the close of 1898-99 grants to the extent of Rs. 48,800 were sanctioned. Through the personal exertions of Mr. Chatterton extensive orders were received for aluminium ware from all parts of India, resulting by the end of 1898-99 in a sale of manufactured articles to the value of Rs 39,121, while there were in addition materials and articles in stock of the value of Rs. 21,430 and the net profit to Government amounted to nearly Rs. 11,751. A provision of Rs. 1,00,000 has been made in the budget of the current year for the further development of the industry, the nature and extent of which is clearly set forth in the accompanying copy of a Memorandum by Mr. Chatterton on the subject. I am to add that in consequence of the success attained by Mr. Chatterton in the School of Arts, the aluminium industry has been tentatively begun by two private firms in Madras, by the Madura Technical Institute and the Bombay Victoria Jubilee Technical Institute, and it is estimated that during the first twelve months working in this country a business amounting to Rs. 75,000 has been carried on. In fine, the industry has now developed into an extensive business, and bids fair not only to provide work for numerous workmen and agents but to supply the wants of the people in respect of household and cooking utensils and also the requirements of certain departments of Government.

6. The details given above will afford to the Government of India some idea of the growth which the aluminium industry has already attained. Of the advantages of the introduction of the metal into the country there can, I am to say, be no doubt, and the industry is one which clearly deserves to be fostered, extended and encouraged by Government, but some considerable time must elapse before the business can be left to private enterprize, which is the object to be ultimately attained. It appears to this Government that the success attending the introduction of the aluminium industry invites endeavour on a wider scale to introduce new or rescusitate old industries in this Presidency through the medium of technical schools. This attempt can fittingly be made and with excellent prospect of success by utilizing still further the expert knowledge and skill of Mr. Chatterton. This officer, who at present holds the post of Professor of Engineering at the Engineering College and who has in his leisure time and by his private efforts introduced the aluminium industry so successfully, has devoted much attention to the study of technical education and has for some time past undertaken to some extent the work of inspecting technical, industrial and art schools without extra remuneration. While developing the aluminium industry, he has toured extensively to various industrial and commercial centres for the purpose of extending the sale of manufactured articles and has thus been able to ascertain local needs and conditions and the prospect of introducing new industries. His Excellency the Governor in Council therefore proposes to withdraw Mr. Chatterton altogether from the College of Engineering, and taking advantage of his special knowledge in technical and industrial matters to place him for a term of three years on the special duty of restoring, organizing and developing those technical trades and industries, especially metal work and connected industries, which appear most likely to prove successful in this Presidency. It will, I am to state, be necessary for Mr. Chatterton hereafter to draw up in consultation with the Director of Public Instruction a complete programme of work, but the following are among the objects which he will have in view:

(1) the development of the aluminium industry;

(2) the inspection and reorganization of existing industrial schools and the establishment of new ones;

(3) the development of indigenous technical industries; and

(4) the establishment of a manual training class in the College of Engineering workshops, or elsewhere.

7. This Government considers that it is probable that at the end of three years the aluminium industry will have so far developed that it may be safely left to private enterprize, and that it will then be possible to judge what further industrial developments are feasible. If these prove to be important, it will be necessary to consider the advisability of retaining Mr. Chatterton on the same duty or possibly of making the appointment permanent. I am to add that it is proposed to give Mr. Chatterton, while on this special duty, the pay to which he is entitled in the Educational Department, *viz.*, Rs. 1,000 together with a deputation allowance of Rs. 150 a month and travelling allowance at the usual rate, and I am to request that with the concurrence of the Government of India the sanction of the Secretary of State may be obtained to his appointment.

8. I am further to state that His Excellency the Governor in Council considers that Mr. Chatterton deserves a substantial recognition from the Government of the time and labour devoted and the pecuniary risks incurred by him in starting the aluminium industry, and proposes that he should be granted an honorarium of Rs. 1,500, to which I am to request that the sanction of the Secretary of State may be obtained.

M. HAMMICK,

Acting Secretary to Government.

Ootacamund,
5th August 1899.

Educational Department.

NOTES CONNECTED WITH G.O., Nos. 504, 505, EDUCATIONAL. DATED 5th AUGUST 1899.

[Subject.—*Development and improvement of local industries.*]

From the Director of Public Instruction, dated 1st June 1897, *No.* 5851.

This file is submitted as requested by the Secretary. Although the current is dated 1st June 1897, it seems necessary that the file should lie over until orders are issued about the School of Arts.

A. Edgington—29-8-98.

Yes.

H. Tremenheere—30-8-98.

From the Director of Public Instruction, dated 15th December 1898, *No.* 14180.

Mr. Chatterton applies for an additional allotment of Rs. 15,000 on account of the aluminium industry in the School of Arts. The sums already allotted amount to Rs. 30,000—*vide* G.Os., No. 518, Educational, dated 18th August 1898, and No. 688, Educational, dated 5th November 1898.

He also recommends that a provision of one lakh be made in the budget for 1899-1900 on account of the industry. Only a provision of Rs. 30,000 has been made in the budget now under issue in the Financial department.

Orders are solicited.

T.K.—17-12-98.

With regard to the additional allotment asked for, the Director of Public Instruction states that no savings are available in the current year's Educational budget. The Financial Department may be asked whether it can sanction it from any anticipated savings.

A. Edgington—17-12-98.

Submitted to the Honourable Member for orders, through the Financial Department (with a linked file containing a letter from Messrs. Best & Co.).

H. Tremenheere—17-12-98.

Please put up again in Educational. I am sending back in Financial.

A. T. A[rundel]—19-12-98.

initial outlay of about Rs. 20,000 will also be required for additional buildings, workshops and tools and plant. It will be met from the above grant and will be subsequently recouped from profits from the sale of aluminium articles.

4. For his work in connection with the industry Mr. Chatterton requests that a personal allowance of Rs. 500 per mensem be given him from 1st April 1898. The Director of Public Instruction however recommends that for the work done in 1898 such bonus as Government may deem suitable be paid and that from 1st April 1899 a personal allowance of Rs. 300 per mensem be given in addition to Rs. 200 recommended in the Director of Public Instruction's letter No. 4437, dated 17th April 1899, for the inspection of technical and art schools. The sanction of the Secretary of State will be required for the grant of the bonus and the allowance now recommended.

5. As to the details of the working of the school it is stated that a special code of rules will be drawn up as soon as some experience is gained of its working and after Government pass orders on the reorganization of the School of Arts. The papers connected with this subject are now in circulation having been submitted to His Excellency the Governor on the 23rd April 1898. A letter from Messrs. Best & Co. requesting to be furnished with information as to the intentions of Government in regard to the aluminium industry carried on in the School of Arts is also in circulation having been submitted to the Honourable Member on the 20th March 1899.

P. T. THARYAN—28-4-99.

This current may, it is submitted, go to the Financial Department for remarks before going to the Honourable Member.

A. EDGINGTON—1-5-99.

Undoubtedly if the aluminium industry at the School of Arts is pressed, it will develop rapidly into a very large concern and provided the Government intend to make it a large business managed on commercial principles, the proposals as regards establishment seem moderate enough.

2. I have not seen the papers in circulation about the reorganization of the School of Arts, or Messrs. Best & Co.'s letter. It is submitted, however, that caution is necessary in working up this business, or complaints will soon be made by firms in India that the Government are conducting a large commercial business, with unpaid supervision, and competing unfairly with private firms. Mr. Chatterton's proposals mean apparently that he wishes to set up a large export business of hand-made silver, brass and aluminium work from the Government workshop. If this is done it will not be very long before there are complaints of undue competition.

3. Secondly, it seems very much to be questioned whether Mr. Chatterton can do justice to his duties as Professor of Engineering at the Engineering College, while so much of his time (which he values at Rs. 500 per mensem) is taken up with outside duties. He says he spends more time at the college than is prescribed in his time-table, but as Professor (not *lecturer*) it is surely intended that all his best efforts should be given to the college. It would seem well to have the opinion of the head of the college on the matter before more of Mr. Chatterton's interest is given to this "metal industry".

4. It is submitted that the Secretary of State is not likely to sanction anything like such an allowance as the proposed, and leave Mr. Chatterton his salary of Rs. 1,000 at the college.

5. The whole matter of pushing this industry and making it not only a teaching school, but a pioneer institution established on a basis of commercial profit, supervised by a Government officer, seems to require more consideration than the Director of Public Instruction has given it.

M. HAMMICK—8-5-99.

Referred to the Financial Department as regards funds.

M. HAMMICK—8-5-99.

FINANCIAL DEPARTMENT.

The immediate additional expenditure involved by the proposal to separate the aluminium work from the School of Arts and to constitute a "school of metal work" is estimated at Rs. 8,316 per annum on establishment and Rs. 20,000, as an initial outlay, on buildings. There is no objection to this expenditure being met in the current year from the grant of one lakh provided in the budget for the aluminium industry. There appears objection however to the entertainment of any of the establishment on a permanent footing. The other metal work (silver, copper and brass) which is being done at the School of Arts would be transferred to the new school and it is proposed to transfer the permanent silversmith maistry of the School of Arts on the same pay (Rs. 50) as a permanent senior maistry on the teaching staff of the new establishment. The Director would also make the head clerk on Rs. 75 permanent. As long as the aluminium industry pays, the Government will not be committed to any extra charge, but as pointed out in the Educational department note there is danger of complaints arising if the school is continued to be conducted for any length of time on a commercial basis. It would seem advisable therefore to avoid all permanent arrangements as the whole scheme cannot but be for sometime experimental.

There is Rs. 300 at least, *i.e.*, Rs. 3,600 per annum for Mr. Chatterton's allowance to be debited to this scheme. It is not clear that the debit should not be Rs. 6,000. The whole cost will then be—

	RS.
	8,316
	20,000
	6,000
Total ...	34,316

G. STOKES.
31-5-99.

G. STOKES.
31-5-99.

2. There is also the question of the proper debit of the cost of the new school to be considered. In the new school the work in aluminium will continue as at present to be conducted on a commercial basis until the trade is firmly established and private enterprise is able to compete with it. The work of the school will then cease to be commercial and will become educational, unless in the meantime some other direction is discovered in which a similar method of working becomes feasible. In the preliminary issue of the civil budget estimates for the current year the anticipated receipts and charges on account of the aluminium industry were included in the transactions of the School of Arts and were entered under XIX. and 22. EDUCATION. But as the aluminium business was assuming large proportions and as the revenue and expenditure of the Educational department were exaggerated by its transactions the estimates of receipts and charges of one lakh each on account of the aluminium industry have in the final figures passed by the Government of India been transferred to XXI. and 26. SCIENTIFIC AND OTHER MINOR DEPARTMENTS. As the new school then is for the present to be worked on a commercial basis its transactions would fall under SCIENTIFIC, ETC., DEPARTMENTS, but as soon as it ceases to be commercial and becomes educational its transactions should properly be shown under EDUCATION.

3. As pointed out in the Educational department note the sanction of the Secretary of State would be required for the grant to Mr. Chatterton of the bonus and allowance recommended.

Vide article 277 (2) of Civil Account Code.

F. A. D'CRUZ—24-5-99.

C. M. SCHMIDT—29-5-99.

If the cost of this scheme is to be met from the lakh provided in the budget, there is no objection to this expenditure, if approved by Government, from a financial point of view. There is roundly a sum of Rs. 1,10,000 unallotted in 45. CIVIL WORKS. Out of this there are now proposals in the Local and Municipal department for the utilization of the lakh of rupees except about Rs. 10,000. There is therefore no other source except savings which presumably should come out of the Educational

budget from which the balance of this expenditure Rs. 24,316 can be met. As pointed out above no permanent arrangements as to establishments should be made in this matter.

G. STOKES—31-5-99.

To the Educational Department.

EDUCATIONAL DEPARTMENT.

I am surprised at Mr. Stuart sending on with his support such a proposal as this, especially as he knew from conversation with me that a scheme was under consideration by Government for putting Mr. Chatterton on special duty in connection with technical trades, aluminium industry included.

It had better be disposed of as "Recorded with reference to G.O., No. , dated ". If the scheme therein put forward is sanctioned by the Government of India and the Secretary of State, proposals with regard to the aluminium industry will be called for from the Director of Public Instruction.

A. T. A[RUNDEL]—21-6-99.

Demi-official from Mr. F. J. E. Spring, to H. A. Sim, Esq., Private Secretary to His Excellency the Governor, dated Madras, 3rd February 1898.

As I have already told you verbally I am not losing sight of His Excellency's instructions that I should write him a note on the subject of technical education. But I am rather anxious that I should not appear to take the initiative in a matter in which I happen to know that Dr. Duncan is considerably more interested than he was before his and my recent visit to Calcutta. I think I told you that I took Dr. Duncan to see the Seebpore College Technical department in virtue of my having been a Member of the Board of Visitors of that College as well as being still a Fellow and Member of the Engineering Syndicate of the Calcutta University and of having been chiefly instrumental in inducing the Bengal Government to endow that College as they have done and to make entirely over to them the very extensive Engineering Workshops.

Dr. Duncan was very much impressed by what he saw there and I have no doubt that if His Excellency wished him to do so he would say what he thought about it. But if it passes out of his mind by lapse of time, for want of being recalled, it will be a pity.

I really do not know that I can with any advantage write any more than I have already written on the subject. Mr. A. Chatterton on the other hand is eminently fitted to write on the subject. Indeed at my request he has I know strung some notes and suggestions together. But they ought to reach His Excellency through Dr. Duncan.

I wrote something some few years ago at the request of the North Western Provinces Government, and I have written to their Director of Public Instruction for a copy and he has promised to send it.

When it comes I propose to send it to you for His Excellency's perusal, and it seems to me that it would seem less as if I were meddling if His Excellency were to send that Note, written years ago for the North Western Provinces Government, to Dr. Duncan, rather than if he sent him a Note written ostensibly for Madras and were then to ask Dr. Duncan to formulate suggestions.

My own ruling principle in everything is always to *choose your man*, if possible a specialist, and then give him a free hand to make a programme within certain fixed limits of expenditure of course. Then consider all he has to say, and see whether his advice is or is not feasible. At least his advice will be more valuable than that of a non-specialist who can get listened to merely because he occupies a certain bureaucratic position.

Well. What suggests itself to me is that if it has impressed itself upon this Government, as it has upon the people of America, Germany and other countries that owing to one cause or another too much State aid and State attention have been given to the conveyance, to the brain, of ideas through the medium of black marks on paper *via* the eyes and that too little attention has been paid to the kind of "education" that gets at the brain through the fingers and muscles and that the average youth all over the land is becoming a two dimension creature, seeing and thinking in the flat instead of a three dimension creature as God made him, thinking in the solid. Well: if they have happened to have arrived at this conclusion, the right thing to do seems to me to get a three dimension influence into the Educational service of the Presidency, and let this influence at least have a chance of formulating its advice.

Unfortunately the Civil Service, like the Educational service, is largely manned by two dimensioned persons. My service is a type of the three dimensioned sort of service. We are paid (very badly alas!) for making veritable solid things instead of writing about other people doing them, and we are apt to think evil of the men who are responsible for trying to turn many millions of people, mostly peasantry, into readers and writers of black mark on paper. So I fear it will be thought that I make a far too radical suggestion if I say that in my opinion the right thing to do is, under the Director of Public Instruction of a country, to appoint a *Director of Manual Training*. You can get no better man than Chatterton. He will improve in many ways as he grows older. But he is an exceedingly able man and most thoughtful, reliable and enthusiastic. I should like His Excellency to hear what Arundel has got to say about this, and I know also what Duncan thinks about Chatterton. Chatterton *can* advise in this matter and his advice would be well worth securing. My very crude ideas are at His Excellency's service and are somewhat as follows:—

First, let a country make up its mind on the general idea above referred to, viz., ought not a system of Public Instruction to concern itself with the conveyance of ideas to boys by means of actual *things* instead of merely by means of marks on paper, the very meaning of which it takes him years to learn and which are too apt to be looked upon as the end instead of the means?

Next, if it feels assured that a radical change of system is necessary for at least a large fraction of its school children, how is it going to set about it. You have no teachers, so there is no good in beginning at the bottom for several years to come. You first want a carefully designed Normal school for the training of ordinary mofussil school teachers so that they may be able to convey ideas to the children in a sort of Kindergarten manner, and to the older boys by tape, chain, compass, map and a certain amount of crude shaping of materials. Mind all this is already thoroughly formulated and well known to specialists, only if your two dimensioned educational man ever read of it (you may bet he never *saw* it) he only despises it as not leading up to scholastic honours as he knows of them.

Well, as you gradually get a few competent teachers, you plant them at first in the schools of the larger towns where artisans' children congregate. But it will be years before you find enough of them to get them into the village schools. If your Director of Manual Training has his regular inspections, etc., boys will gradually be found, whose natural bent is towards the *making of things*, like that of my young friend, son of Bhashyam Aiyangar, now an Executive Engineer in Mysore. Then these are the boys who will want to get into your technical schools and colleges. At present the boy who comes to a technical school is the boy whose schoolmaster tells him that he is too big a fool to pass into Government service through the University door. Perhaps he is a three dimension boy, perhaps not: nobody at present has any possible means of knowing whether he is or not. But if parallel with your literary lower grade education you had a manual education also, beginning at Kindergarten your practical or three dimension boy would evolve himself by a sort of natural selection process, instead of being passed as at present through a sort of sieve, the University, whose holes are not in the very least so shaped as to tell you in how many dimensions he is built.

Some few millions of people are by nature fit to be lawyers, clerks, etc. Some few thousands of others are by nature fit to be artisans, engine men, tinkers, dyers, cotton spinners, mechanists, surveyors, architects or civil engineers. But you put the whole of them, through many years of their youth, through a sort of training fit only to bring out the best of the former lot, and then you wonder first why the educated classes are so discontented, and then why it is that our people do not naturally drift into industrial pursuits.

I say let the two sorts of training run parallel for some few years, and by examinations, prizes, scholarships to the higher manual schools and colleges and by adequately paying the three dimensioned schoolmasters, let it get into the heads of the boys that industrial employment is at least not less honourable than paper employment. Then you will find some boys just as naturally keen about the solid things as others are about the paper things, and the *right* boys instead of the wrong boys will come forward for your higher manual schools and colleges and finally you may expect that their keenness as well as competition for a living will drive them into inaugurating industrial pursuits. Bengal was, I suppose, twenty years ago quite as devoid of mills and industries of sorts as Madras is now. But ask Dr. Duncan what he saw going up the Hoogly, and now if they only had room to turn three or four hundred young artisans of the foreman class out of Seebpore every year instead of 40 or 50 they would all find employment.

It seems to me that in dealing with an educational subject like this I must think not of India of 1898, but of the India of 1920, when the boys whom we now talk of will be in full swing of work, and I cannot see why industrial conditions should not be as much more forward in 1920 compared with now as they are now as compared with pre-mutiny days. Anyhow let us have a hand in laying the foundation of such progress if it is to come at all.

NOTE BY MR. F. J. E. SPRING, ENGINEER-IN-CHIEF OF THE KISTNA BRIDGE

On the report of the Technical Education Committee of North-Western Provinces and Oudh.

In compliance with the request contained in the N.W.P. Government's letter, No. $\frac{1362\ E}{III.\ 245}$ of August 27th, 1891, which has reached me through the Government of Madras, I offer the following comments on the recommendations of the N.W.P. Committee on Technical education, dated June 30th, 1891, and can only regret that in the midst of heavy practical work I am unable to devote to the subject the time, the thought and the attention which in my estimation its importance demands. If in the following paragraphs I go beyond the text of my instructions and enlarge upon matters other than those which have been touched upon by the Committee, my excuse must be that the opportunity appears to be a suitable one for reference to certain matters which will have to be dealt with, and successfully dealt with, if Technical education is ever to become as real and as effectual a power in the lives of the people of India as is that other sort of education which is tested and sealed by the various Universities.

2. I must crave the Committee's indulgence if I commence by saying candidly that they have not gone deep enough to the root of the matter, neither, so far as I can recollect, has any other Committee, or Government, or essayist. The recommendations which have been made are excellent as far as they go, and carefully thought out, and well adapted for immediate application. I, however, consider all such measures to be merely temporary and palliative in the treatment of the great disease, that of UNHANDINESS, from which middle class India is suffering, and that for the cure of this unhandiness we must go deeper than is indicated by any of the Technical Educational nostrums which have so far been offered to India. After reviewing the Committee's several recommendations I propose to avail myself of the present opportunity to suggest a method by which the Education Department may perhaps be able to partially cure this great unhandiness; perhaps within a period of one generation, perhaps not before two, but, as I believe, sooner or later. It may be a long look ahead, but if we officials only looked forward to our own time it would be a poor look out for India. As a class we have not, I think, failed in this respect, but in looking forward it is not always possible to take in a sufficiently wide horizon. Two departments, the Engineering and the Educational, looking ahead, shoulder to shoulder, should be able to command a more extensive prospect in advance than either alone, especially as the matter is one which is to both of common interest. This must be my excuse for going outside the subject of the Committee's recommendations, and for offering to the Education department a suggestion in regard to a matter which is within their functions to deal with.

3. Of the several subjects which have been handled, the one which for me possesses the greatest interest is that of the better adaptation of that most admirable and deservedly appreciated institution, the Thomason College at Roorkee to the modern and practical requirements of India, and of us Engineers who are large employers of various descriptions of "technical" labour. I cannot too highly commend the Committee's advice that Thomason College, by being placed under the Educational Department, should be brought into line with the general educational scheme of the province. That it should for so many years have stood isolated and apart may perhaps in days gone by have been a source of strength and of vitality. But times in India have changed, educationally and otherwise: the conditions of employment have radically altered: there is a wider field for the general employment of properly trained men than existed when the college was organized: and it has for some time past been an anachronism that Thomason College should have remained under the control of a department which at no other point has been in immediate contact with educational development. If any system of education is to successfully provide for the steady advance of ambitious students in their chosen line of training, it is, I think, essential that from the lower, through all the intermediate, to the highest type of School or College there should be a regular and recognized connection. By standing aloof from the general educational scheme of the country, Roorkee must, I conceive, have frequently failed to secure promising youths whom, under a better system, she might have hoped to attract to her classes.

4. As an Engineer of 21 years' service in India, I have naturally come in contact with a large number of men, both Engineers and Subordinates, who have received their training at Roorkee. I can testify that a considerable percentage of the Engineers thus trained are very valuable public servants. Most of those of them whose parentage is English have had the disadvantage of an Indian up-bringing: but from whatever cause, whether the influence of Roorkee College associations, or the self-reliance which is often concomitant with success in severe competition, or the fact of most of them having had the advantage of education in the bracing climate of the Hill stations, they are, in my judgment, distinctly better men than the average to be found, of Anglo-Indian origin, in other walks in life. The case of the successful native Engineers is somewhat parallel to that of the Europeans. They are, so far as I have had experience of them, superior in some respects, in energy perhaps, and in fitness for positions in which self-reliance is [illegible] native Engineers trained at other Indian colleges. Holding these opinions of the Engi[illegible] who have heretofore been trained at Roorkee, I advocate the reorganization of the college, not because I think that it has been a failure, but because I foresee in its expansion and development a very high capacity for extended usefulness in the old as well as in new directions. We in the Engineering profession in India owe gratitude to Roorkee for the good work which she has done in the past, and I at least shall look forward to the results of the present discussion as a renewal of her lease of life, and as certain to ensure to her a prosperous future career.

5. I desire that it be clearly understood that in the following suggestions regarding the Principalship of the college I am in no way referring to the past or present Principals: I am referring to a reorganized college, which will in future be under the Educational Department under conditions which make it eminently probable that the Principalship may be conferred upon purely educational experts. I cannot too strongly insist that the Principal of Roorkee Engineering College ought to be an Engineer, and one too who has had extensive experience of Indian practical work. His experience moreover ought to be modern experience. He ought in my opinion most certainly to take a large share in teaching, and how to enable him to find time for this I shall indicate later on. His special subject should be practical constructional Engineering in all its usual Indian developments. The college is, if anything, an Engineering College, and it is as necessary that a sound practical Engineer, familiar with the students' future work and difficulties, should be at the head of it, as that an experienced physician or surgeon should be at the head of a College of Medicine.

6. The time of the Principal of such a college must always be a good deal occupied with disciplinary and managerial questions, so he will have little available time for the preparation and delivery of lectures unless he is efficiently assisted in his general duties. The Principal ought therefore to have, as his Secretary, a good English man of business, of the type which makes good Club Secretaries and Assistant Traffic Managers of Railways. Such a Secretary, who would look upon his position in the college as a career, ought to be easily secured for Rs. 500 a month. This would leave the Principal freer for the far more important duties of superintending the curriculum generally, and for personally teaching so much of practical Engineering as it is possible to teach at a college. It is essential, for the maintenance of a good tone throughout the college, an English tone, and for the suppression of the inbred Indian proneness to general slackness and dowdiness, that the Secretary should be an *English gentleman*. It is important too that there should be no social obstacle to his intimate personal association with the Professors and the Principal. This may seem a small matter to lay stress upon: but it must be remembered that in an Indian College, far more than in an English one, is it the case that the character and the "form" of the students are still susceptible of being moulded for the better.

7. Before leaving the subject of the Principal I may refer to the apparent inadequacy of the reasons for so greatly restricting the field for selection of a competent Principal by the maintenance of a rule, or a custom, that he must be an Army officer. There appears to be an idea, to my mind a whimsical idea, that, because a few British soldiers are received into Roorkee, the Principal, if not the Professors, must necessarily be an officer in the army. If a civilian is found who possesses the qualifications for the Principalship which I have specified above, it is unlikely in the extreme that he will experience any difficulty in handling a few Englishmen whose only disability for easy handling is that they happen to be soldiers. This is a curious military contention which it would be waste of time to try to refute. It needs no refutation for those Royal Engineer officers who are familiar with the conditions of great public works as carried on all over India, where Civil Engineers successfully handle large numbers of difficult Englishmen.

8. Seebpore and Roorkee have had the advantage of perhaps as able teachers of Applied Mechanics and of Theoretical Engineering as need be desired, but the chances will be always against such educational experts having been recently in practical touch with modern Engineering. Professors of Civil Engineering and of Applied Mechanics need not at all necessarily have recently been in professional practice. The Educational Department will thus in future cases have to consider only those qualifications of professorial candidates of which they as Educationalists are capable of judging. For the other professorships there is now in England a source of supply of first-class technical teaching talent. The Education Department must persistently demand that the college be furnished with suitable and modern scientific teaching appliances. A visit to such an institution as the Finsbury School of the City and Guilds of London Institute would open the eyes of too tight-fisted Financial Secretaries who grudge a few thousand rupees for a supply of appliances to the whole of India, like those which, at the cost of many thousand pounds, the enlightened London Guilds have put into two or three rooms. There is always a risk that those who in India hold the purse strings may be too prone, and perhaps naturally, to look upon Chemistry, Electricity, etc., as so many subjects to be learnt out of books with a view to the obtaining of so many marks. To an Engineer Chemistry means the definite weighing, measuring and handling of natural substances in order that he may usefully afterwards understand their ways, when entrusted by the State with the spending of perhaps gigantic sums of money: the difference between the knowledge of the natural sciences which is obtained from books and that which is gained in properly-equipped laboratories may, without the aforesaid Financial Secretary being aware of it, mean to his budget a difference of lakhs in a very few years. All this has been thoroughly threshed out long ago, and it is very disheartening to know that one must usually talk to Indian non-expert officials as if the question were in its infancy. To establish an ill-equipped Technical College is a rank and a stupid waste of money, time and brains, and an idle *dilettante* playing with a subject which deserves more serious treatment. Professors, Principals and Directors of Public Instruction are each in their turn too apt to refrain from pressing the matter knowing what the Financial Department's reply will be: and all the time the latter is shoveling out lakhs to be spent by the very men for whose more efficient education in its economical spending the comparatively paltry demand is being made.

9. I presume that it is intended later on, with the aid of a Committee of experts, to definitely lay down a detailed curriculum for the Civil Engineer's course of studies. I don't think, however, that any very useful end will be served by adopting a course of instruction other than that which has recently been laid down in great detail for Seebpore. I should have liked to have seen the adoption by the Committee of the Seebpore course in its entirety, manual, theoretical, subsequent practical and all. I think that the N.W.P. would be wise to follow the example of Bengal and to offer Local Self-Government appointments to men who just fail to secure the guaranteed Public Works Engineerships. Each prize of the sort that is added is a considerable incentive to the schools to send their best boys to the college.

10. This brings me to a very important question, whether there ought to be any such affiliation of the Thomason College to the provincial University such as now exists between Seebpore and the Calcutta University, and if I am not mistaken, between the Engineering Colleges of Madras and Poona and the Universities of Madras and Bombay. The guaranteed appointments are now allotted to Seebpore students on the results of the Calcutta University examination for the degree in Engineering. The University examines through the medium of Engineers and others whom the Senate appoint in the way which seems to them to be best, and at the advice, no doubt, of competent experts. It has comparatively recently been arranged that in two special subjects, most difficult for outsiders to fairly examine in, the candidates shall be examined by the college Professors. The other examiners are not Professors of the college which is most concerned: it is quite possible that they may not be familiar with the general spirit of the course of instruction: it is enough indeed to say that they are not necessarily Educational experts, at least in the subjects which it is most essential to efficiently test. Now I don't call this a satisfactory test. I would greatly prefer to pick my men on the results of an examination conducted entirely by the college authorities were it not for this one thing, that the Seebpore Professors have not had any modern constructional Engineering experience. So long as this state of things continues, and with the existing University

test, there is no great objection to its continuance, it is essential, in my opinion at least, that one or two outside Engineer Examiners should have a say in the sorting out of candidates; and to Seebpore College this is secured by the University examination as at present arranged.

11. I look upon it as exceedingly probable that when once Thomason College has come into the hands of the Education Department, it will be proposed that it should be connected with one of the Universities so that such advantage as in public estimation attaches to a degree may be secured for the successful students. If the hope of attaining to University recognition is believed to have any appreciable value in the eyes of students, parents and guardians, such as will ensure admission to Roorkee being more sought after, I would most certainly advise that the necessary connection of the College with the University, for degree conferring purposes, be arranged for. If asked to suggest how best to arrange for the conferring of University degrees upon Roorkee students, I would refer to my own University, Dublin: there Engineering degrees are conferred in accordance with the results of a University examination conducted by the Professors of the Engineering School which is attached to the University. Outside examiners are not called in. The results are satisfactory because there is no competing school of Engineering whose students might object to being examined by men who had been engaged in teaching their rivals. I cannot see where any difficulty would come in, in applying such a system to Roorkee. When the College Engineering curriculum is drawn up, let it be submitted to the provincial University, and let the latter agree to recognise the final examination held at Roorkee as a University examination for the conferring of Engineering degrees.

12. This may perhaps appear to be an artificial and an unnecessary arrangement, but I consider it a perfectly legitimate means to a very desirable end, that of making a Roorkee training more generally valuable in the eyes of the guardians of clever and promising boys. When I receive applications for appointments, one of them from a man who can only produce the Roorkee College Certificate, and the other showing the Calcutta or other University's degree letters after his name, I am very apt to attach a perhaps undue value to the latter, and to offer him employment in preference to his rival. The disability which now attaches to Roorkee boys of not having the University stamp set upon their educational record is, I believe, a real practical disability, the abolition of which would aid recruitment, and thus ensure a supply of cleverer boys. Should Thomason College at any future time drift entirely into the hands of men who are Educationalists pure and simple, the University examination thus conducted would in my opinion be largely lessened in value as a test of suitable preparedness for practical work. There is one matter in which the reorganised Roorkee might usefully follow Seebpore, that is, in according due recognition to the fact of any specially industrious students having attained to an ordinary Arts degree. It is of the highest importance to encourage men to try for an Arts degree as well as for the strictly technical degree, as we thus secure a few all-round well-read men, so far as that can be secured by the Arts course.

13. I now come to a question which appears to me to be of very high importance, the manual training of the Engineer students. The course of manual training at Seebpore as formerly arranged was undoubtedly too heavy a strain on the energies of students, and the recent ruling deferring it until the fourth year, was I think a good ruling. The North-Western Provinces Committee propose that instead of setting apart a whole year to the manual course, three or four hours a week should be devoted to it throughout the whole of the three years of book study. Now it would be too sweeping an assertion to say that all Indian-bred boys of the educated class are unhandy up to the date of their leaving school; but I don't think that such a statement would be excessively wide of the truth. It is to cure this unhandiness that I should like to see a year set apart for practical work, as now arranged at Seebpore. If it is carried on throughout a three-year course for one morning a week it will not have nearly so good an effect on the boys as if a whole year were devoted to it. Still I quite understand that there may be many considerations at Roorkee, questions of accommodation and of house room and others, which make it advisable that the course should be a three-year course with a subsequent year on works. Much good might be done by the offer of marks for manual dexterity at entrance, or by insisting on a pass qualification. This would induce the Hill schools and other places from which students for the Engineer class are recruited, to devote more attention to a branch of training and discipline which cannot be begun too early, especially in the case of young men who will all through their career be in contact with persons who actually *make things* instead of merely with those who have to do with papers. I entirely concur with the Committee's recommendation as set forth in paragraph 25 with reference to the subsequent training of Engineer students on works.

14. About Mechanical Engineering, properly so-called I think it a very remarkable fact that India has developed so few professionally trained Mechanical Engineers. Considering the skill of India's handicraftsmen, I think it is wonderful that some native trained professional skill should not have already found its way into the officers' grades of our railways. With sixteen thousand miles of railway we might have looked for sixteen native Mechanical Engineer employés, in the position of Assistant Locomotive Superintendent: but I believe I am right in saying that there is not even one. For this there must undoubtedly be some very sufficient reason, and it ought to be possible for the Education Department to find out what this reason is and to endeavour to remove it. Owing to the absence of any sort of

manual training in the large majority of our schools, as well as to native habits of thought, the educated native as a class is in all matters demanding the use of his hands slovenly and inaccurate to an extent that to English managers of machinery and of a drawing office appears to be simply contemptible. Even trained natives may be found who think that a rough dab of a soft pencil is quite as accurate a mark on paper as a fine needle point: both are small things, that is, both are less than a thumb's breadth, therefore one is as good as the other. Slovenliness would be quite sufficient to spoil all chance of an Indian trained man ever getting beyond the probationer stage of the Locomotive service of Indian Railways. I think that this disability is quite susceptible of being cured, and I think that the proper place to cure it is the Mechanical Engineering class of a College like Roorkee. I would train a few of such Engineers annually, and I would offer to one of them the prize of admission to the Locomotive service of the State Railways if his year of probationer training should be satisfactorily reported on. If manual classes increase in number and efficiency in our schools the chances will be greater of good men coming forward as candidates for regular professional training in Mechanical Engineering. I think I am right in saying that almost to a man the Locomotive Engineering service is recruited direct from England, and that the object of this is to secure the desired accuracy and carefulness which India cannot up to the present guarantee. In the Mechanical side of the College extreme and minute accuracy should command high marks and slovenliness and inaccuracy should be serious offences. It goes without saying that students of this class must be skilled, rapid, and accurate practical draughtsmen.

15. With regard to the limitation of the number of students, it appears to me that questions of demand and supply deserve in this matter no consideration at all. Demand will follow supply. House accommodation ought in my opinion to be the only restriction to the number of students admitted into the various classes. In connection with this question of the number of admissions, it may not be out of place to suggest that the Government of the North-Western Provinces and also of the Punjab, would show much practical wisdom in letting it be known that for employment in certain branches of the public service Roorkee students are considered to be suitable candidates. In the Postal, Telegraph, Customs, Opium, Police and other Departments, Imperial and Provincial, a Roorkee training ought to command a high measure of consideration when the rival claims of candidates are being compared. A man who has been trained as an Engineer, even if he has failed to attain the necessary final certificate, or, having gained it, has failed to obtain employment, is, other things being equal, at least as good and as fit a man for the various miscellaneous branches of the public service as the present scratch lot picked up anyhow. If the extension of practical education is worth encouraging, it is worth being encouraged by such methods as this.

16. About admission to the Roorkee Engineer classes, I decidedly agree with the Committee that the F. A Examination, and in it, a thing not referred to by the Committee, a certain number of marks in Mathematics and English, should be a *sine qua non* for admission. One of the greatest difficulties with which a native boy has to contend is that of rapidly following technical teaching conveyed to him in a foreign language. To insist upon a certain percentage of marks in English at the F.A. would secure improvement in this respect. For all students, European and Native, the advantage of having got at least as far in their Mathematical Studies as is indicated by the obtaining of a good percentage of Mathematical marks in the F.A., is a matter that requires no demonstration. I more than doubt the need of a Classical language for European Students at the College Entrance examination; French or German would be far more to the point. Classically trained masters of Indian schools may perhaps not concur, but I would attach little weight to their opinion in this particular matter. As a mental discipline, a training in a modern European language is as good for an Indian-bred boy who cannot acquire it where it is habitually spoken, as is a dead language: and of the two, dead or living, there is no question but that, for the Engineer, acquaintance with one or more living languages is more practically useful than a knowledge of Latin or Greek. I assume of course inability to acquire satisfactory proficiency in both dead and living languages in the case of Indian boys who are obliged also to excel in Mathematics. This concludes what I have to say about the Engineer classes, except that I may add that the Secretary to the Principal would in all probability be found to be a very suitable teacher of the principles and practice of ordinary Accounting, a thing much neglected, but very necessary in the case of men who are not only strictly professional men, but who are responsible for the expenditure of public money.

17. I now come to the important recommendation of the Committee that a class should be established at Thomason College upon the same lines as the very successful class at Seebpore for the training of Mechanical Apprentices. The Committee appear to me to take a less encouraging view of the future prospects of employment for this class of men than is justified by circumstances. It is natural that a Provincial Committee should look upon the Province as the proper sphere of future usefulness for the men whom it is intended to train. The trained men will however scatter all over India as men of their sort usually do; and I believe that as many as it is possible to train will have no sort of difficulty in earning respectable livelihoods. Here for example my workshops are full of, and my engines and hoists are driven by, men of every sort of nationality from the extreme north of

the Punjab, from Bombay, Kurrachee, Calcutta, and Madras: and when as a class they get a better training they will be even freer than now from the old-fashioned stay-at-home restraints. I would however make a suggestion which will I hope in years to come result in largely widening the area of employment for skilled and educated artizans of the better class. As, in Bengal, no steamer is permitted to carry passengers unless the engines are in charge of a man who possesses the necessary certificate of, I think, 5 years' approved training and apprenticeship, so there ought to be similar legislation about engine-driving on railways. At present men *grow* into being engine-drivers: they pass through the stages of cleaner, shunter, etc., etc., and after a while find themselves, on some lines at least, entrusted with the driving of passenger trains. I do not refer here to English trained drivers: these, if brought out from England by their Locomotive Superintendents, or if engaged there under covenant by the India Office, are generally a very superior body of skilled and reliable men whom it would be stupidity to meddle with. I refer to Natives, Eurasians, and Europeans of Indian birth and breeding. I think that it ought to be laid down by the Legislature that men of this class must go through a recognised course of four years or five years apprenticeship, accompanied by a suitable course of book-training. For this nothing much better could be devised than the Seebpore course for Mechanical Apprentices. I would only modify it by arranging that the last 1½ years should be spent under the orders of one of the Locomotive Superintendents of the N. W. Ry., the O and R. Ry., or the B. and N. W. Ry., so that the apprentice might have a chance of learning the ordinary work of a driver. I believe that the institution of such a source of supply of educated drivers would be welcomed by Locomotive Engineers. The number of ordinary uneducated native drivers is increasing every year, and if the Roorkee boy proves himself as good an all-round man as his Seebpore brother at the end of his five years apprenticeship, the inevitable increase in the number of native drivers need not be a cause of anxiety.

18. There is a great difference between the three or four hundred a month that is earned by a good English driver and the twenty to forty that the native earns. This appears to indicate that there would be a demand for well educated and intelligent men to earn from 50 to 100 a month. Practical qualifications being equal, a Superintendent would presumably prefer to get the man who had received a good technical training for but little higher pay than he must now give to the man, Eurasian or native, who has grown into being a driver any way. This responsible and honourable occupation, in England looked upon as one of the highest forms of manual labour, ought in the future to provide more than ample employment for all the suitable men that Roorkee can turn out of her Mechanical Apprentice class. It is, I need scarcely say, eminently necessary that the Educational Department and the Roorkee Principal should get into intimate touch with the employers of this sort of skilled labour, so that the course of training may as far as possible be arranged to suit employers' requirements. As I have said, I think that it would be difficult to arrange a more suitable course than that in use at Seebpore. with the final year and a half spent in obtaining approved Locomotive experience.

19. There need not necessarily be anything in the course adopted at Roorkee which would be unsuitable for a Mechanical Apprentice who saw his way to anything better than engine-driving. Men would be qualified for general mechanical employment of all sorts: in the Public Works Department, in mills, in steamers, and in charge of waterworks machinery. The reason why I have referred at such length to engine-driving is because I consider that the training which makes the best and the all-round most useful Locomotive driver, is a kind of training which is eminently fitted to make a man a master of his trade in any other line of subordinate Mechanical Engineering that he may take up. I shall now make a suggestion which I think will be of a real utility to the future detailed reorganizers of Roorkee College. It is that the co-operation be sought for of that most valuable and useful body of experts, the Locomotive Committee, which as I write is arranging for its third annual meeting. The Locomotive Committee fairly represents the Locomotive Engineering talent of some 15,000 miles of railway. It has already done much of the best description of work of the sort that such a Committee can do. If the question of the most suitable training for an educated class of mechanical handicraftsmen, for employment in various capacities on Indian railways were to be referred to this Committee, through their Secretary Mr. E. H. Stone of Simla, a suitable reply and valuable advice would, I am confident, be forthcoming. And, moreover, a matter also well worth considering, the proposed class would be advertised amongst its future employers in the best and widest possible manner.

20. There is one question of the highest importance which I must not omit to refer to, that is the connection of Roorkee College with the Roorkee Canal Workshops. I regret that I know practically nothing at present about what is the nature of the connection between the two, and can only say that I think that it ought to be as close a one as circumstances will admit of. One thing is essential, and that is, that the College Workshops should be Teaching Workshops, and not necessarily Commercial shops. If they pay so much the better; but if they don't pay, the annual cost of their upkeep is a very small insurance for the Province to devote to securing for herself a full provision of suitably trained men. This is in conformity with Sir Charles Elliott's views as expressed in his Education Department Resolution, dated Calcutta, April 21st, 1891, in the following language:—"The Lieutenant-Governor attaches

very great importance to the maintenance of the College (Seebpore) at the highest possible point of efficiency. He considers that the increase of the number of young men trained to Engineering pursuits, and qualified by their training to develop the resources of the Province, is an object on which he is justified in incurring large outlay, since he is confident that all such outlay will be fully reproductive," and again "Orders have been issued in the Public Works Department that, in future appropriation of funds for expenditure on Public Works, it may be arranged to send a sufficient quantity of work to Seebpore shops, so as to keep them regularly and fully employed." As foreshadowed in the Bengal Resolution above quoted, it will I hope come about in the North West Provinces that one of the steadiest sources of employment for the future Roorkee Teaching Workshops will be the manufacture of suitable plant and teaching appliances for the minor manual schools which will in good time be found scattered throughout the Province. The true function of a manual school is less the teaching of how to make things, than the teaching of the uses and the principles of the tools and appliances with which things must be made.

21. Before leaving the subject of the future Mechanical Apprentices, I must refer to the supremely important subject of teaching them drawing. As I am writing for educational experts and not for practical Engineers, I may perhaps find some difficulty in conveying the meaning which I wish to convey, though every experienced Engineer will know at once what I mean. Drawing is not an end, it is a means to an end: it is a universal language: it is a method whereby at a trifling expense and with no waste of materials a trained man may decide to a minute fraction of an inch how he is going to cut and bend and weld and join heavy and expensive material. From the way in which I have more than once heard this subject discussed in this very connection, it might be thought that drawing meant the making of pictures to be looked at, and to please the eye. The sort of drawing that an Engineer refers to in connection with the subject of technical education is the sort which as I have said is a mere means to an end: a thing to be torn up and flung aside once it has served its temporary purpose, unless it is to be subsequently used again, when it may be put away in a drawer and then taken out to be used as a tool when wanted. The drawing I refer to does not mean what is usually called the "application of the principles of design" or any of that sort of jargon of the real Art Schools: it has got nothing to do with the making of things that are intended to be artistic or beautiful. All that sort of thing is a function of the Art Schools properly so called, and for these there is also a place in a complete Educational scheme. A man who has the sort of training to which I refer will take his two-foot rule, and his pencil and his note-book, and will clamber all over a machine or an engine or a structure and will fill the pages of his book with perhaps greasy little sketches, all fully dimensioned over and scribbled on. Then ten years hence, when perhaps at the other side of the world, he will be able from these sketches to make perfect scaled drawings of the thing that he has sketched, and by their aid to supervise the construction of a precisely similar machine or structure. With the aid of the sort of drawing I refer to a trained man who has got an idea in his brain of a perhaps complicated machine, will work it out on paper so that to himself and to everyone else who can read this universal language it appears to work and to move and to perform all its functions so surely, that a firm or a manufacturer may by its aid decide whether or not to embark capital in its production.

22. I have had a tolerably wide experience of Native and Eurasian and European artisans, as well as of men of a class who think it beneath them to do more than direct others how to work. I can say as the result of this experience that a knowledge of the sort of drawing that I refer to is one of the greatest wants of this class of men. He must be taught to make rough rapid intelligible dimensioned sketches from the real solid thing, and then to put them rapidly down on paper to scale, in such a fashion that the thing can be unhesitatingly made by workmen who have never seen the original thing. In all our workshops all over India, except perhaps in the large locomotive shops where there is skilled English supervision, there is, I venture to say, as much material and labour wasted in five years, just through this lack of knowledge of technical drawing, as would endow the Roorkee workshops in permanence. I shall return later to this extremely important subject, that of drawing, but will meanwhile pass on to consider the Roorkee class for the training of Overseers for employment on Civil Works.

23. It is very essential for the training of good useful Overseers for employment on Civil Works that during at least a year of their course they should be classed with the Mechanical Apprentices. All the studies of both classes ought for the first year to be amalgamated, and they might afterwards diverge. It is of great importance that the Civil Overseer class should become less unhandy than they now generally are. I have known a group of them from one of the Indian Colleges who were phenomenally unhandy: and that this is largely the case is proved by the condition in which men of this sort habitually keep valuable instruments, and the unmechanical manner in which they generally go about things that require a little mechanical knowledge. For almost any description of work, civil, or mechanical, I personally would prefer to engage a man trained as the Seebpore Mechanical Apprentices are trained; they are not skilled surveyors, but very few men fresh from any College are skilled surveyors; skill, rapidity and accuracy come with practice. The Mechanical Apprentice has had the sort of training which is of all others, best calculated to cure the congenital flacidity of the middle class Native of India; he is in fact more likely to turn out an all-round good man, and is not ashamed to metaphorically and literally take his coat off on occasion. It is with a view to

engrafting a little of this manliness on the Civil Overseer that I would class him with the others for a year, and make him work in the shops. I would in the end give him marks worth earning for horsemanship and physical activity.

24. I wish now to invite special attention to an anomaly which has long flourished at Roorkee, and which as a distinctly mischievous anomaly ought to be abolished. A generation ago when the supply of Europeans in India who possessed any technical skill was exceedingly limited, and when Natives and Eurasians had not the opportunities which are now open to them of obtaining a good education, it was thought necessary by the then existing Public Works Department, to largely recruit the Civil Overseer class from the ranks of the British Army. There is certainly no longer any such necessity. The supply of willing young men, the sons, many of them, of skilled English tradesmen, is rapidly increasing, so rapidly as to be admittedly a source of administrative anxiety. To the exclusion of an equal number of boys of this sort Roorkee goes annually to the ranks of the British Army for a considerable supply of material from which to train Civil Overseers. It is not, I presume, claimed by any one that the possibility of attaining in India to a few of such appointments annually is any appreciable aid to the solution in England of the recruitment difficulty. But for all that I know to the contrary there may in Garrison, in Military works, be greater ease in dealing with these men; if so well and good, recruit the requisite number by all means: but let nobody imagine that we, Engineers on Civil Works, find any special advantages in the accident of an employé being in the army: such a man is on the contrary a source of some not inappreciable inconvenience in many ways, owing to the way in which he is by code rules surrounded and swaddled in all manner of paper regulations which in no respect enhance his efficiency for the getting of work done. As I say, by all means train as many British soldiers at Roorkee as the Royal Engineers officers of the Military Works Department find to be necessary for their work, and by all means also pay these soldiers any salary that may be found to be necessary to secure them: this is a matter of no concern to Engineers who are in charge of Civil Works. What does concern us, however, is this, that when more soldiers are trained than the Military Works Department can absorb, and when these men are consequently thrown on our hands for employment, along with their late civilian class fellows, the former should be given a grade of seniority over the latter. The system is a wrong one, and I unhesitatingly condemn it. It was not deliberately invented by the present Public Works Administration, but is a survival which nobody has seen fit to point to as no longer a necessity. Like the sentry who used year after year to be posted six times a day at a certain place near the wall of one of the Royal Palaces, and whom it was nobody's business to remove, until an enquiring archæologist discovered, and pointed out to the proper authorities that the first of a long series of sentries had been posted at that spot in the reign of Queen Anne, on the occasion of a breach having been temporarily made in the wall to admit something for which the ordinary gates were not wide enough. I could not but admire the wisdom of an English driver whose boy was at one of the hill schools: I was commending the father's common sense intending to make his son "list for a soldier" but he went on to explain that the boy meant to go through the listing process without any intention of soldiering, but only as a preliminary to entering Roorkee with a view to emerging a grade ahead of his school fellows who were entering as civilians. The soldier-overseer who is employed on Civil Works most certainly renders to Government no equivalent for the loss which is indirectly sustained through the ill-feeling and dissatisfaction to which this unjust supersession gives rise amongst his civilian classmen. I think I am not wrong in saying that a civilian overseer trained at Roorkee and appointed in 1890 may find himself superseded in the Department by a soldier-overseer who was a year junior to him at College and who got his appointment in 1891. That this should be so is wrong and unjust, and what is perhaps worse, it is short-sighted and stupid. The reorganisation of Roorkee College which is now in hand affords a fitting occasion for abolishing this mischievous anomaly.

25. There is room in India for the employment of a large number of highly trained Surveyors. There are I believe many men who, finding themselves smarter than their fellows at surveying, though less smart in their mathematical elementary Engineering studies, would prefer to curtail their course of training by one year with a view to obtaining a Surveyor's certificate. The last cold season of this class might be spent with advantage entirely in the field under just such conditions as prevail in actual survey practice in India. We cannot at present very usefully employ fresh Civil Overseer or Surveyor students from Roorkee upon railway survey work. It takes at least a season to teach them what the real thing is; rapid rough sketch survey: the neglect of non-essentials: the careful noting of essentials: three or four miles a day of fairly accurate levelling: helpfulness in the field, and the management of labour for jungle cutting, and such practical matters. I think that the professor of surveying, and the entire survey class of the College might most usefully be placed for three or four months every year at the disposal of an Engineer-in-Chief of a Railway Survey whenever such an arrangement is found to be practicable. A College Surveyor was following me with a survey, which he knew perfectly well was to be plotted to no larger a scale than 400 feet to an inch; as he lagged some days behind me I returned to see what was delaying him. I found him surveying a wide sandy rotten banked nullah by the aid of little traverse lines of two or three hundred feet long, where he could see straight for a mile; and his offsets were being measured with a tape, and he was noting feet *and inches* for the width of the nullah in his note-book This is only an instance of the slobbery unpractical lack of common sense which can easily b

cured by a little care to make the teaching conditions accord better with those of actual practice. Really good rapid and reliable Surveyors are expensive men simply because there are so few of them that the good ones can command higher salaries than the talents necessary to make a good ordinary Surveyor would entitle them to claim. The Surveyor class ought certainly to go through a year of the manual course, and this training might in their case be easily made to bear specially on the subject of instrument repairs.

26. Mr. Kipling of Lahore has set Roorkee an excellent example in the successful establishment of his practical drawing class which is, I believe, principally attended by young artisans. I know some of the results of this class particularly well, and can testify to the very high value of the trained carpenter draughtsman To that contemptible fraud falsely called a draughtsman, who swarms into our offices, a drawing is a mere complication of lines on a piece of flat paper, and if in his incomprehensible wisdom the Sahib evolves from such a tangle of lines a new and a different tangle, why, it is all a part of the Sahib's skill, but a thing to the "draughtsman" quite unintelligible. He will *trace* such a maze of lines all right enough, in a purely mechanical manner without a ghost of an idea of what it all means. A College Overseer will occasionally be found who knows more about it, but unless constantly practised he too loses what little he ever knew in a very few years. We want in India the trade of skilled draughtsman. It is a trade which in England, though very much overmanned, commands about a pound a week in its lowest grades, and most of the men from whom this trade is recruited have commenced by aiming at something much higher, and have a training which, but for the overcrowded state of the trade, would entitle them to expect better salaries. In India we have practically no such class, and we require it badly. If all the Technical Colleges in India agreed each to provide twenty draughtsmen annually, of the sort that is procurable at less than half the wages of an engine-driver in England, they would not more than meet our requirements, and we would in a few years see the present contemptible lot of so-called draughtsmen relegated to their parental trade of tracer of designs for embroidery. There is one thing which an English boy speedily learns in an Engineer's or an Architect's drawing office in England, and that is that he is not worth his keep unless he can draw fast as well as accurately. He also learns that it is possible on occasion to draw accurately without elaborate finish. The man to teach them this sort of thing in an Indian Technical College is most decidedly *not* the Art teacher who has been trained in England under the auspices of the Science and Art Department. A better man could be got out through the medium of the City and Guilds of London, the rival Institute. The teacher of Engineering draughtsmanship for the reorganized Roorkee would be a man who had been head draughtsman, or second draughtsman, in great Engineering works in England that had been in the habit of engaging in miscellaneous work, not engines alone, and not bridges alone. A really good man would be very cheap at 500 or 600 rupees per month. It must be recollected that such a man as I have described will probably for several years have been in the habit of teaching a considerable number of young men in the best modern practical manner. He might well be assisted by a picked student of Mr. Jobbin's School of Art, Calcutta, or of Mr. Griffiths' School, Bombay. To Mr. Kipling's young carpenter draughtsmen it is a matter of indifference whether they "draw" a thing in wood in the solid, or on paper on the flat. They *think* of it in the solid; whereas the present lot of so-called draughtsmen in our offices think of things primarily in the flat, and it is difficult to get them to see that the thing is a conventional representation of a solid. What we have to do is to exchange the Muhammadan *Darzi* draughtsman for his far more intelligent countryman the Sikh Carpenter draughtsman.

27. I have now dealt with the following classes which must, it appears to me, form the basis upon which a reorganized Thomason College must be built up: (*a*) Civil Engineers, (*b*) Mechanical Engineers, (*c*) Mechanical Apprentices, (*d*) Civil Overseers, (*e*) Surveyors, (*f*) Draughtsmen. It would not be difficult to combine parts of the courses of the two Engineer classes (*a*) and (*b*) so that economy in lecturing power may be secured. Similarly it would be easy to combine the courses of classes (*c*), (*d*), (*e*), (*f*), in certain subjects common to two or more of them, so that time and useless expenditure of energy may be saved. This would all naturally be arranged for in laying out the detailed schedule or hour plan of the courses. I may now leave the consideration of Thomason College and pass on to the other subjects which have engaged the attention of the Committee. I refer to the subjects of Agricultural Colleges, Art Schools, Railway Schools, Industrial Schools and Normal Schools. Leading up to all these however and to the future success of all Technical Schools and Colleges throughout India is the great subject of the introduction of some sort of preliminary manual training into *all* schools which come under the influence of the Education Department. This latter is a very large and an extremely difficult subject, and one the practical discussion of whose details a Director of Public Instruction need not be ashamed of shirking. It must, however, I truly believe, be tackled sooner or later, and the earlier we begin to discuss it the riper will be our plans when the time draws near for practical action. I shall leave this great subject for the present, and pass on to the consideration of the descriptions of schools which have above been referred to.

28. The true function of an Agricultural College is not so much to train practical agriculturists, as to diffuse throughout the country, amongst the class of native officials whose influence with the peasantry is great, a knowledge of the elementary *principles* of agricultural,

veterinary, and sanitary science. If it is conceded that this is a good end to keep in view, it may hereafter be found practicable to recognize the Agricultural College certificate as counting in men's favour for employment in the Subordinate Revenue Service. The continuous provision of a supply of suitably trained teachers for the theoretical agricultural classes of high schools, would also be a function of an Agricultural College. It appears to me that such a college would be the most suitable place possible for the establishment of a large vernacular class for teaching the elements of surveying, and of sanitation as well, to village patwáris. I learn that it has been arranged, in one district at least in Madras, to pass all the *karnáms* or *patwáris*, of the villages, through a course of field surveying under the Revenue Survey Department. I also learn that a section of the Madras Revenue Survey is being moved in one or two to Oudh. The necessary experience of what is wanted will, if this is true, be forthcoming. If during the next ten years we succeed in distributing throughout the districts, through the medium of an Agricultural College, a considerable number of native officials whose daily duties bring them in constant intimate contact with the masses of the people, having first indoctrinated these officials with the rudiments of practical agricultural, veterinary and sanitary science, we shall have made a distinct advance forward towards the solution of many difficult problems. A knowledge of, and of the importance of attending to, the elementary rules of the three branches of science above indicated, can at best filter down with extreme slowness amongst the masses of the people. The more numerous however are the points of contact between the taught and the untaught the faster will be the hoped-for downward diffusion.

29. When four or five years ago a suggestion was made that an advance in agricultural and veterinary knowledge might be usefully brought about by a judicious arrangement of the text of elementary school reading books, there was some crackling of thorns under pots, and references to I think "Ba Ba Black Sheep," and "Mary had a little lamb," in an Indian newspaper which did me the honour of reviewing me. I retain, however, the opinion which was then ridiculed, and now again put it forward, that in no other way could the Educational Department assist so well in the work of improving the ordinary villager's knowledge of elementary principles of farming as by calling to their aid the reading lessons of the village children's earliest books. The sole object of the printed sentences as at present arranged is to teach the children how to read. In Europe the secondary object of teaching them elementary religion is also aimed at. As in India this latter would be injudicious, or worse, let something else be substituted for it: stories about the beasts, and the farm, and the well, and what the boys and their parents had to do with them, and all that came of it. Childish by all means, but for all that none the less instructive if judiciously arranged with some regard to the ordinary agricultural condition of the country whose next generation of cultivators are the children now under instruction.

30. It would be difficult to exaggerate the importance of extreme caution in dealing with the subject of art schools. This is just the kind of subject into which fools may lightly rush where angels fear to tread. I greatly doubt the expediency of any connection at all being maintained between industrial drawing schools for the benefit of the modern Arts, and Art Schools for the benefit of Fine Art. In a Fine Art School, a thing difficult for any one to advise on unless he is an artist and an Indian expert as well, like Mr. Kipling or Mr. Griffiths, I would rigorously exclude anything that savoured of mechanical or industrial drawing of the sort which I have already described. There is a strong tendency, as exhibited in the Calcutta School of Art, to let the two things, which differ as greatly in essence as a cirrus cloud differs from a factory chimney, come into too close contact. If it were possible I would bury my art schools in the heart of the Rajputana desert, in Jaipur, in Bikanir, or in other of the essentially Indian cities, where they might hope perhaps to escape, for a few years longer, being smirched by contact with the products of the eminently useful, but not very heavenly, factory chimney. Nothing but mischief can result, in my opinion, from the introduction of western types of ornament into close contact with living native art, and enough of this latter fortunately survives at Lucknow and Agra to make it worth the while of an enlightened Government to endeavour to preserve the flickering flame. It is the most delicate of flames, and can only be preserved from extinction by such care as is being taken with it at Jaipur and at a few other places where it has been fortunate in falling into the hands of intelligent lovers of the artistic. As surely as the forms of conventional western ornament are introduced into Indian cities where oriental art has heretofore flourished unpolluted, so surely will the forms of the latter degenerate and disappear. As the forms and the methods of the eastern artist are in our eyes beautiful, it may be for complex reasons difficult to analyze, so are our forms beautiful in his eyes, perhaps from their very regularity and novelty. It is a permissible function of a Government, like ours in India, to foster what remains of the old and the beautiful native art, and as long as possible to keep it from injurious contact with another and antagonistic, though possibly equally beautiful, series of forms. Educational advisers appear to me to rush into this subject too light-heartedly and with too little sense of responsibility. The needs of a modern city like Calcutta which is nearly devoid of anything original or oriental in the way of art or design, are no indication of the true needs of a province like the North-Western and Oudh, whose cities are still the homes of the descendants of the men by whom some of the most beautiful examples of oriental art in the world have been designed.

31. What I advise is this. Certainly, by all means have an Art School at Lucknow or at Agra, or at both, but let it be a school of real oriental art. I would be presumptuous to advise as to details, and need only hint at what Mr. Griffiths in Bombay will understand, that the living art of the North-Western Provinces may perhaps be not only not injured, but may even receive fresh vitality from being brought into contact with examples of the art say of Ahmedabad and of Jaipur: whereas, were it brought into contact with accidental art, it would, almost certainly, be irretrievably injured. The horse and the ass are each in their own way useful and serviceable animals: the result, however, of their exclusive union is the ultimate extinction of both breeds, though for a few years the resulting mule may do a great deal of useful work. I advise that technical drawing schools be established wherever necessary, but that in every possible way, even in name, they be kept apart from the art schools. Even "Free-hand drawing" need not necessarily pretend to connection with the artistic. The freedom of hand that the artisan needs for sketching is perhaps best imparted to him by his being set to copy ornament in the flat: but then while he is doing this let nobody go mincing around and gushing about "Art": the boy is merely being taught one of the elements of an exceedingly useful trade, but art need not be dragged in. I may be misunderstood as intending to deprecate any association of art with things of every day modern utility: but all that I desire to express is this: That you are as it were standing in the British Museum, and are about to arrange for the installation in it of the electric light; I beg that you don't rush off and snatch MAGNA CHARTA for use as an insulator, and the CODEX ALEXANDRINUS to paper the walls of the engine room. Very much better insulators can be bought outside made of clay, and wall paper of superior quality is obtainable at two pence a yard. For all that, there is no reason why Magna Charta and the Codex Alexandrinus should not be copied and photographed, and mended if injured, and tended and preserved perhaps for another thousand years, but *not* in the room with the dynamo.

32. The term INDUSTRIAL SCHOOL is usually applied to a school in which boys are taught a trade. Now the conditions of learning a trade are in India such special conditions that there is exceedingly little need, as a general rule, for the establishment of Industrial Schools. The boys who mean to practise at a particular trade are the sons of the present men who practise that trade: the baker's apprentice is not the son of the carpenter, nor is the young carpenter the son of the blacksmith, as in western countries. I would therefore say don't waste time over industrial, or TRADE SCHOOLS, *except in certain localities*. If anywhere in the province there are wide districts in which there are fewer tradesmen than the district has real need of, that is, if there are any large districts containing uncivilized and aboriginal tribes, these are the districts in which to establish trade schools. Missionaries too might find their establishment useful, as they certainly do in Southern and Western India, where severance from caste cuts a boy off from the existing system of learning a trade. In organizing a complete scheme of technical education for a province, I would leave the consideration of trade schools for the last, and would confine myself for some years to merely offering to those that have already been established such encouragement as may be derived from the general approval and interested enquiries of Government. Referring to India as a whole, I would indicate a rough quadrangular area, of which the four corners are Calcutta, Allahabad, Nagpur and Masulipatam, as the area in the heart of which perhaps twenty to fifty trade schools might be judiciously dotted about. I am not informed whether in the North-Western Provinces and Oudh there is any suitable tract, unless perhaps Government may have fenced off some "criminal tribes" in a selected area.

33. RAILWAY SCHOOLS at the great locomotive centres are in my opinion by far the most promising sources of supply of an improved class of intelligent artisans. Properly managed such schools may do wonders. The pupils are boys all of whose associations are connected with the handling of tools, the making of things, and the erection and the guidance of machinery. To these boys an engine or a shed full of machinery is not the inexplicable novelty that it is to the gaping villager who, because his father perhaps has been a pensioned surveyor, or a clerk in the Public Works Department, is sent up to Roorkee to be trained. The Railway School boys are the sort that I want to see trained for Roorkee. The sons of the leading mistries and native and Eurasian foremen will be the best possible material for the new mechanical apprentice class. They will have every chance of admission to their old workshops, and if the course of the Railway schools is arranged so as to work *towards* Roorkee, the latter will secure the very best sort of students. But little manipulation of tools need be taught in a railway school: elementary Mathematics and English would however be very necessary for the small selected upper class of Roorkee candidates, and above all, DRAWING. Every workman's son in a railway school should be taught how to read a dimensioned sketch, how to make from it a rough scaled drawing, and how to make an intelligible set of sketches and scaled drawings from a given piece of the solid. The only manual training I would give them would be simple lessons in the manipulation of soft wood, sheet metal, and lead, the latter for the *principles* of forging. This is the system of one of the most useful of the classes of the splendid technical school at Finsbury under the City and Guilds of London, which is largely attended by young tradesmen of every kind. I don't believe that except its system were a good one, a trade school like that at Finsbury would succeed, as it does, in retaining its popularity amongst intelligent working men, in the very heart and centre of working London.

34. Normal Schools for the training of Technical teachers will be exceedingly difficult things to work out in detail. I am disposed to think that a general system of giving scholarships for the purpose of retaining the most promising senior pupils, in the various schools, Roorkee and others, for teaching purposes, would be, at least temporarily, the best solution of the difficulty. To teach a man how to teach there must be a class to be taught, and that class must not, in such a matter as Industrial teaching, consist solely or even largely, of youths who intend *only* to teach. Technical classes lend themselves exceptionally well to being utilized for the training of teachers. Later on, as things develop gradually, it will be necessary to train, in considerable numbers too, I hope, the masters of *all* schools in the best sort of very elementary manual teaching. I cannot however pretend to any knowledge of the conditions of existing Normal Schools in the Province, or of the possibilities of their expansion, such as would justify my venturing on a definite opinion in regard to the details of this important matter.

35. As without giving the elements of a literary education to large numbers of boys we cannot look forward to the development of an occasional literary genius, so unless we place the primary elements of an industrial or manual training within reach of a large number of youths, we cannot fairly look forward to the rapid industrial development of the country. As a knowledge of at least reading and writing are needed before a boy can judge whether he cares to go forward in the one sort of career, so in the other sort of career a boy can scarcely judge of his probable future tastes and inclinations unless he is taught the use of his hands. I don't think that it would be very wide of the truth to assert that the large majority of Englishmen who have succeeded as Engineers were led into the career of their choice by some such accident of their boyhood as access to tools or to a lathe or to a laboratory. I believe that an experience similar to James Nasmith's as related in his autobiography is a very common experience amongst practical Engineers.

36. The primary schools ought to teach every boy how to make some sort of a correct sketch of anything that is put in front of him. A book flung down, the master's desk, a village cart, the Persian wheel, any *thing* in fact that he sees in front of him. I don't refer to copying diagrams on paper. The Educational Department may, with extreme facility, within two or three years, arrive at being able to judge for themselves whether there is any power of using the universal language of drawing amongst their pupils in the primary schools. It then rests with them to give a suitable value to such talent when found, by examining and marking in it. In the town and High Schools the thing thus begun on the most humble scale could be still further developed, and the result would gradually be that a better prepared lot of pupils would come forward for a regular technical training. The universal teaching of drawing of the very elementary character above indicated is, in my opinion, a matter of which the after results, in future years, may be confidently and hopefully looked forward to. To gradually provide for all schools a suitable set of standard models for this sort of drawing, would be a gigantic matter if one were not able to indicate a system whereby the desired supply may be gradually acquired. To this I refer in the next paragraph.

37. A proposal to KINDERGARTEN the whole of the junior school population of India may perhaps be scouted as a wild and an impracticable suggestion. But I maintain that if there is one country more than another which has drifted into such a condition that the only cure for the monumental unhandiness of the middle class is to Kindergartenize the rising generation that country is India. Had we been wise enough to do this thirty or forty years ago we would not now have to deal with the discontent and the disappointment of a large majority of the men who have availed themselves of our Educational system. *Any* sort of manual training in our village schools, even mud-pies if nothing better is available, is better than none at all. I cannot even hint at what is wanted as to details; all I know is that the subject is not a new one, that it has been thoroughly worked out, that it has long been in full operation in schools for children on the Continent of Europe, and that it is rapidly making its way in England. The manual training demanded in the primary schools must necessarily be of an exceedingly elementary character. Later on however, in the High Schools a very much more advanced course might be arranged for. If these latter schools did little more than prepare drawing models for the primary schools the two ends would be attained of a manual training for the High School pupils, and a supply of drawing models for village schools. The whole subject however is so entirely a subject for experts that I dare scarcely more than hint at it. It would be mere folly for any non-expert, whether in the Educational Department or not, to venture into formulating a course. Skilled advice is obtainable in England and ought to be secured, and secured too in no conventional red tape manner, but by diligent enquiry for the best man for the money and when he is discovered, the putting of the necessary routine in motion to secure him.

38. It is no discourtesy to the Indian races as a whole to say that we the English in India are indisputably an abler race than the races we govern. Moreover, the fact is undeniable that we *do* govern them: for worse or for better, and on the whole for the better. With what we at the time conceived to be the highest practicable wisdom, we thirty or forty years ago instituted for them a complete, smooth and rounded system of education by the aid of which any boy may under favourable circumstances rise from the lowliest position in his village to be

Chief Justice of Bengal. Our system was grasped and assimilated by far larger numbers than its founders ever dreamed of, and one result has been the outcry for some openings for educated energy other than merely literary openings. In one special direction, that of Medicine and Surgery, our Educational system has splendidly adapted itself to practical needs. In another, that of Engineering, its efforts have been far less successful. In the lower branches of technical education the Educational Department's efforts have, I think, been hampered by lack of exact knowledge of the probable effect of conditions which in India differ most widely from parallel conditions in Europe. They have been too sanguine in hoping that, in India, the country of caste, manual and semi-manual systems of instruction would be largely availed of by the educated classes. They have found out that those who do avail themselves of these classes are the boys who in the literary courses have found themselves to be failures. To have found himself even a partial failure is a moral blow from which better boys than Indians and Eurasians find it difficult to recover; and yet in spite of this the Technical students who have so far been trained at our Colleges are admittedly a success. This encourages the hope that, with a better system leading up to a high technical training being looked at by the boy as a real aim in life, and not merely as a *pis aller* to be adopted in the event of failure, we may attain to a sort of success which is worth striving for. Under the present system, up to the time of his failure to matriculate, all the boy's own ideas, and those of his parents, and of his associates, and more particularly of his masters, have been that except in book work there is no salvation. Suddenly he finds this much desired book career closed to him, and, as he and all his friends consider it, he *descends* to the technical system. If from the time he was learning to read he had it all the time in front of him that manual work and drawing are highly valued by his masters and Inspectors, and subsequently that, in the High School, manual dexterity combined with skill in drawing and in mathematics meant the earning of marks, and the esteem of his teachers and the envy of his fellows, he would realise better than now that there is something else to look forward to than the career to which mere book work leads him. With the extension of manual training to all schools there will, I claim, be an increase in the number of youths who discover that this, and not reading and writing, is their real vocation in life: the result will be increased demand for admission to our Technical Schools, and a very much improved supply of labour and brains for the yearly increasing occupations which, as civilization and railways advance, demand such a supply. It is because, as I have claimed, we *are* the abler race, and because we *do* govern the people, and moreover because our experience is that they are largely ready to honestly believe that the efforts which we make for their advancement are honest efforts, and because they readily avail themselves of our systems when these systems are wisely thought out so as to suit existing conditions, it is because of these reasons that I claim that we would be entirely justified in the introduction of a manual training into *all* our schools from the lowest to the highest.

39. In the potency of its influence for good or for evil, for advancement in the right direction or in the wrong, for progression or for retrogression, no one Department of all those by which the Government of India is carried on has anything like so great a chance as has fallen to the lot of the Educational Department. All others either deal with men as they *find* them, or deal with *things*. The Education Department alone deals with the soft material from which the future race is to be moulded, and this material submits itself fairly unreservedly to the moulding process. It must, I imagine, be difficult even for a thoughtful educationalist to realize how immense is the influence, and the corresponding responsibility, of his branch of the service, and how largely he has it in his power to mould the habits of thought, and the budding public opinion of the rising race. The existing public opinion of a very large portion of Indian middle class society is that to do things with the hands is less honourable than to deal with books and papers. I am not so sure that for the maintenance of this particular phase of public opinion well into the last decade of the 19th century, the Educational Department are entirely free from blame, and I believe that they have it in their power to vastly improve public opinion in this respect. I believe that the gradual introduction of an elementary manual training into all schools will greatly aid in the attainment of the desired change.

40. Before finally closing this already lengthy paper I must return for a moment to the Roorkee College Engineer class, to say that in regard to this class we are, in my opinion, moving upon wrong lines, until Government see their way to partially or wholly carry out the recommendations of the Public Service Commission, that a separate Provincial Service should be established for the Public Works Department. We are now dangling before the eyes of Indian school boys a very limited number of what to them, or to the large majority of them, are exceptionally and unnecessarily large prizes. They themselves would, I believe, prefer to be offered a larger number of smaller prizes. The very same identical men would compete for the smaller prizes and we would get the same value in service out of them as we get now. It would be flogging a dead horse to again go over all that has been argued and written upon this subject. A man whose parents have never had more than perhaps a hundred rupees per mensem, and who has always lived in India and means to stay here, is double as well off on five hundred a month, and four times as well off on a thousand, as an Englishman whose *home* is in England and to whom India is a mere incident however seriously he may take his duties, and who must live as his people have always lived so far as India will allow, and who must,

if life is to be worth living at all, get home on leave at certain intervals. Not only in salary, but in leave, and in every way, is the Indian-bred boy, European, Eurasian, or native, remunerated on a far higher scale than the English boy. The Indian boy moreover does not ask for this, neither do his parents: most would prefer a larger number of service appointments, with a lower scale of remuneration. The result would be that, for the class of duties for which the large majority of Indian trained boys are best adapted, we would gain what we now lack; more efficient inspection, during construction and for maintenance purposes, of a very large number and mileage of very scattered works, for whose efficient supervision we cannot, under the present system, afford to give the men.

41. I regret to find, on a re-perusal of what I have written, that what I had originally intended to be a brief series of notes on the several recommendations of the North-Western Provinces and Oudh Technical Education Committee, has degenerated into something like an essay, and an essay too on a subject which for proper handling would need far more time than I have at my disposal. I cannot now spare time to alter the form of it, and as I believe sincerely in all that I have written I submit it unaltered in the hope that it may carry more weight as it is than if the words were more carefully chosen. In Technical educational matters there appears to me to be too much anxiety to lay the top stone before we have laid the foundation. The lesson we are learning from the recent census is the very suggestive lesson that the time is already approaching when to make a few extra bushels of grain grow from an acre of land will be a matter of real necessity. This desirable result will be brought about much more quietly and surely if we utilise our Educational system to teach a large percentage of the people how to make a better use of their hands. Hence will follow imitation, invention, and the adoption of what is most suitable in European methods of working; and concomitantly, in my belief, a small perhaps, but certain upraising of the people generally in the scale of civilization, and this I suppose is what we are here for.

BEZWADA,
24*th October* 1891.

FRANCIS J. E. SPRING.

Demi-official from the Hon'ble Mr. D. Duncan, Director of Public Instruction, to H. A. Sim, Esq., Private Secretary to His Excellency the Governor, dated Madras, 19th November 1898.

I enclose reply to your telephone message received through the Government Astronomer on Thursday evening after 5 P.M.

The information given in the big statement I took a clerk nearly the whole of yesterday to compile, as the information had to be picked out from a great variety of papers. The Commissioner's office used to embody information of the kind in the annual report, but it was given up some years ago at the request of Government.

In explanation of the statement I may say that, taking school No. 1, 11 candidates came up, and these 11 candidates amongst them brought up five different subjects for the Elementary examination and three for the Intermediate.

You will also note that some few schools sending up candidates are in Mysore and some in Travancore.

The subjects for the November examinations are different from those of the April examinations.

Statement II shows the cost to Government of carrying on the examinations. This statement has no reference to the cost to Government for teaching, the maintenance of schools, etc., *i.e.*, the cost paid through the department of Public Instruction. That cost will be seen on reference to paragraph 129 of my report on Public Instruction for 1896–97.

It has also to be borne in mind that the Commissioner for Government Examinations has nothing to do with industrial schools teaching up to the industrial standards A, B, C, D (see Madras Educational Rules, pages 54—59). The financial figures given in paragraph 129 of the Public Instruction report include such schools.

ENCLOSURES.

I.—Statement showing the names of schools and institutions that registered candidates for the Technical Examinations held in 1896-1897.

Serial number.	Name of school.	Total number of individual candidates registered.	Grades and number of subjects brought up.		
			Elementary.	Intermediate.	Advanced.
	April Examinations, 1896.				
1	London Mission High School, Vizagapatam	11	5	3	..
2	Government College, Mangalore	5	1	2	..
3	Wardlaw College, Bellary	4	1	..	..
4	H.L.G.M. High School, Tirupati	13	2	2	..
5	Government School of Commerce, Calicut	71	4	4	..
6	Wesleyan Mission Industrial School, Karúr	3	1	..	..
7	St. Joseph's College, Trichinopoly	53	9	6	..
8	Anglo-Vernacular Technical Institute, Trichinopoly	64	14	5	..
9	Technical Institute, Madura	20	2	..	..
10	American Mission High School, Madura	20	2	2	..
11	C.M. College, Tinnevelly	1	1	..	..
12	Madras Shorthand Writers' Association	23	1	1	..
13	Art Industrial School, Nazareth	15	6	2	1
14	Government Industrial School, Mysore	6	3	..	..
15	A.N.Ms'. Institution, Bangalore	30	5	3	..
16	College of Agriculture, Saidapet	38	..	8	..
17	Medical College, Madras	95	..	1	2
18	Young Men's Christian Association, Madras	50	4	3	..
19	Chengalvaraya Nayakar's Commercial School, Madras	56	8	5	..
20	The Anjuman Industrial School, Madras	9	2	..	..
21	S.P.G. Boys' Industrial School, Trichinopoly	1	..	1	..
22	College of Engineering, Madras	22	7	6	2
	November Examinations, 1896.				
1	Government Training School, Vizagapatam	4	2	..	..
2	London Mission High School, Vizagapatam	4	3	..	..
3	Hindu College, Vizagapatam	5	3	..	..
4	Board High School, Amalápuram	2	1	..	..
5	Government Training College, Rajahmundry	14	2	1	..
6	Board Industrial School, Bezwada	7	1	..	..
7	Pittapur Raja's College, Cocanada	20	1	..	..
8	Convent of the Holy Angels, Trivandrum	12	3	1	..
9	His Highness the Maharaja's High School for Girls, Trivandrum	8	1	..	..
10	Industrial School of Arts, Trivandrum	43	5	5	1
11	Government Training School, Calicut	6	1	..	..
12	Brennen College, Tellicherry	21	3	1	..
13	Victoria College, Palghat	10	2	..	..
14	St. Philomena's High School, Bellary	8	3	..	..
15	Government Training School, Coimbatore	14	1	..	..
16	Government Training School, Salem	9	1	1	..
17	Drawing Class, Salem College	19	2	1	..
18	Municipal High School, Máyavaram	5	1	1	..
19	Chakrapani Sannidhi Anglo-Vernacular Middle School, Kumbakónam	6	1	..	..
20	Town High School, Kumbakónam	9	1	1	..
21	Drawing Class, Kumbakónam College	23	4	2	1
22	Board High School, Tiruválór	3	1	2	..
23	Government Upper Secondary Training School, Tanjore	19	1	2	..
24	S.P.G. Girls' Industrial School, Trichinopoly	3	1	..	..
25	S.P.G. Boys' Industrial School, Trichinopoly	3	2	..	..
26	Municipal Drawing Class, Srírangam	2	1	..	..
27	St. Joseph's College, Trichinopoly	23	2	1	..
28	Anglo-Vernacular Technical Institute, Trichinopoly	27	3	1	..
29	Wesleyan Mission Home Industrial School, Karúr	29	4	3	..
30	American Mission Training Institution, Pasumalai	11	2	..	..
31	Technical Institute, Madura	39	4	3	..
32	Art Industrial School, Nazareth	43	8	3	..
33	Reformatory School, Chingleput	14	4	1	..
34	Technical School, Government Press, Madras	72	6	2	..
35	College of Engineering, Madras	1	1	..	..
36	Government Training School, Nellore	6	2	..	..
37	Doveton Protestant College, Madras	17	4	1	..
38	Teachers' College, Saidapet	32	1	..	..
39	School of Arts, Madras	300	9	11	4
40	The Anjuman Industrial School, Madras	16	4	1	..
41	Government Industrial School, Mysore	18	4	..	..
42	Military Female Orphan Asylum, Madras	8	..	1	..
43	Doveton Girls' High School, Madras	6	1	..	..
44	Presentation Convent, Black Town	9	2	1	1
45	Presentation Convent, Vepery	6	2	1	..
46	S.P.G. Training School, Tuticorin	1	1	..	..
47	School of Music, Madras	22	1	1	..

II.—Statement showing the amount spent on Government Technical Examinations held in the year 1896-1897.

Examination.	Stipends.	Contingencies, etc.	Total.
	RS. A. P.	RS. A. P.	RS. A. P.
Government Technical Examinations	13,042 0 0	2,937 0 0	15,979 0 0
Deduct fees	..	..	7,390 0 0
Total net cost to Government	..	..	8,589 0 0

Demi-official from A. Chatterton, Esq., to H. A. Sim, Esq., I.C.S., Private Secretary to His Excellency the Governor, dated 5th December 1898.

I enclose copies of two memorandums on matters connected with industrial education and the aluminium industry; also a report of a lecture on technical education delivered two and a half years ago. I think it is convenient to distinguish between technical and industrial education Of the former, we have nearly enough, and it is the latter that requires developing.

ENCLOSURES.

Memorandum by Mr. A. Chatterton on the Aluminium Industry at the School of Arts.

Was started at the end of March 1898 and the sales during the first eight months amounted to Rs. 26,000 or on an average of Rs. 3,300 a month. Approximately the value of the raw material used may be assumed to be one-half the selling value.

2. The commoner work such as *degshais* can be made by any fairly skilled copper smith; but owing to the fact that no solder is ever used, complicated forms require more skill than is necessary when a metal which can be brazed is employed.

3. Casting, turning, polishing and finishing off require more skill than the ordinary bazaar workmen generally possess, and they require training before they can turn out successful work in aluminium.

4. The School of Arts has done everything possible to induce private people to set up workshops for the production of aluminium vessels, but so far only two firms in Madras have made any attempt—one with very little success, but the other has advertised a great deal and now employs about forty men.

5. Since the School of Arts commenced work, it has been started in the Madura Technical Institute and at the Bombay Victoria Jubilee Technical Institute on a fairly large scale with the very complete plant of English metal-working machinery which was installed there some years ago and which formerly turned out brass bowls, tumblers, dishes, etc. Aluminium working was started there in consequence of the success achieved in Madras.

6. Small quantities of metal have been supplied to a number of industrial schools and private people, but so far nothing tangible has been the outcome of any experiments they have made.

7. The object of the School of Arts has been to pay all expenses and to devote profits made to experiments with a view to developing further uses for the metal and so far it is thought that these ends have been achieved.

8. At present to make the business pay it is absolutely necessary to melt down all the scrap from the sheets used in hammered work and to cast them into forms which are saleable.

9. So far the only commerical result of the working of the School of Arts has been to stop the importation of English and German manufactured goods. Nearly every kind of work can be done in Madras by hand labour at rates consideraoly below those for imported work and for practical purposes the work is stronger and more durable though not quite so well finished.

10. All the men employed in the School of Arts are copper and brass smiths by trade and they can make at present much better wages than they formerly did. Any extension of the business of the school will necessitate the employment and training of more men.

11. The system of working at the School of Arts is highly favourable to the workmen as they get better pay, more skilled work and are provided with excellent workshops and proper tools. Some are paid by piece-work and some by daily wages.

12. Constantly applications for employment are being made and a large number of workmen have been trained in the school and are undoubtedly the better for it.

13. So far only native tools and methods of working have been in use, such modifications being made from time to time as experience showed were improvements and all these changes are, what may be termed, natural evolutions of native methods of working.

14. Experiments have been made with European methods of work but for a variety of reasons they have not been extensively adopted.

15. Our principal customers are Messrs. Spencer & Co, Madras, Messrs. Barnett Brothers, Rangoon, Messrs. Pearson & Co., Secunderabad and Messrs. Rutnagur & Co., Bombay, and there is no doubt that if the advantages of the wares of the School of Arts were properly brought to the notice of similar firms in Calcutta, Benares, Allahabad, Lucknow, Delhi and other great northern towns, a large wholesale business could be developed. Price lists have been issued and the firms who act as agents get a discount of 15 per cent. on articles entered in the lists and special net terms on special orders.

16. The profit on hammered work which is nearly all made on the piecework system is considerable, but the system of accounts is not accurate enough to enable the profit on cast and fitting work to be determined.

17. A good deal of ornamental work has been made and most of it sold and the prospect of finding employment for a large number of art metal workers seems good.

18. One is bound to recognize that in a Government Industrial School a permanent commercial undertaking is not possible, but it does seem desirable in the public interests that the School of Arts should continue working on the present lines for some considerable time to come. Briefly stated some of the reasons why Government should take an active part in introducing the metal into India are—

(*a*) The metal can ultimately be manufactured in India and will take the place of imported brass and copper to the manifest advantage of the country

(*b*) On Sanitary and hygienic grounds its use should be encouraged.

(*c*) At no distant date the requirements of Government for military equipment, for abkári, for hospitals and jails and for many miscellaneous purposes will be extremely large.

(*d*) The field for employment of aluminium in India is so enormous that one Government factory could find plenty of work without appreciably affecting the prospects of other pioneers.

(*e*) The Madras metal workers are probably unequalled in India and the School of Arts, whilst working on a large scale will be able to give them many facilities for acquiring increased skill and experience, which will enable them in the future to send their productions to a much greater distance than they can now do.

19. It is equally obvious that no Government Educational Institution can ever expect to turn out work as cheaply as private firms and it is therefore only under very exceptional circumstances that any manufacturing operation can be carried on at a profit or even without a large loss. This is borne out by the past history of the School of Arts, which has never made a profit on its outturn of work. Quite properly the proceeds from sales have been looked upon as a source of income to help diminish the nett cost of the school but have never been regarded as being capable of expansion to any large extent without a corresponding increase in the gross outlay. If therefore aluminium manufactures can be carried on at the school without loss or with only a small loss it is because there is no effective outside competition and it seems desirable from a public point of view to extend operations as much as possible so long as no serious loss is incurred. By so doing, outside competition will be more effectively stimulated and the use of aluminium more rapidly extended. It therefore seems reasonable to develop the Aluminium Department of the school so long as it costs the State no more than can be legitimately charged to the Educational work which it performs.

20. It must be remembered that the Aluminium Department competes with no previously existing trade in India and interferes with no vested interests as it was absolutely the pioneer in this branch of work in this country. So far as the Madras Presidency is concerned, it has given employment to Madras metal workers and their wares have been sent all over India and Burma and as regards the whole of India it has displaced a certain amount of European manufactured ware and presumably a larger amount of foreign imported copper. So far as the Indian Empire is concerned its action has been distinctly beneficial, so far as the British Empire is concerned it has displaced a certain amount of foreign copper by British—made aluminium. Of course this has all been done on a very insignificant scale but it is necessary to clearly bear in mind that in a minute way it all helps to the development of the industries of both India and England, and its encouragement therefore is desirable. In years to come the Indian aluminium industry promises to be of considerable commercial importance and the exceptional circumstances attending its birth render it possible for Government to carry on the work for some time longer and it seems reasonable to fix the duration of the period of active Government participation in the trade to the period during which it involves the State in no commercial loss.

21. Industrial operations on a large scale usually involve the expenditure of large sums in capital outlay on buildings and plant but the method of working at the School of Arts has been such as to avoid this and there is absolutely no reason why the trade should not be indefinitely extended by a simple multiplication of existing arrangements. For some reasons, all purely educational, it would be desirable to set up a certain amount of modern machinery but this is a question which must be discussed sooner or later quite apart from aluminium if it is desired that the Madras metal workers should not fall out of line with the progress in industrial methods which is generally being made all over India.

22. There is not the slightest doubt that if the aluminium business of the School of Arts were placed in private hands to be run as a private concern, it could, with adequate capital, be developed into an immense and profitable commercial undertaking A trade connection has been formed, a name has been gained all over India and a fund of experience formed of considerable commercial value. In fact, judged as a private concern a valuable good-will has been created and for a time at any rate the public should enjoy it. Gradually as competition sets up the value of the good-will will depreciate and when it has disappeared no one will be the worse if the school ceases to turn out aluminium wares. At the present time the school controls the prices of aluminium wares all over India and so long as it can do that it is doing a useful public work. How long it will continue to do so will depend on the skill and enterprise shown in its management, but there is no doubt the longer it can do so the more firmly will be established the new trade and the sooner will it be possible to take steps to manufacture the metal out here with energy derived from water-power.

From A. Chatterton, Esq., Professor of Engineering, College of Engineering, Madras, to the Director of Public Instruction, dated Madras, 5th August 1898, *No.* 85/*W.*

In continuation of my letter, dated 25th March 1898, which has been circulated to District Boards and Municipal Councils, I have the honour to submit the following additional remarks on the general principles which I conceive should be followed in developing Technical and Industrial education in this Presidency.

2. In considering this subject it is important to bear in mind from the outset the very different conditions with which we are called upon to deal in India compared with those which prevail in England. There the people are wealthy and industrial enterprise has reached its highest development and most perfect organization. Here the people are poor and with the exception of cotton and allied trades industrial enterprise is practically confined to the individual craftsman. There, agriculture has been sacrificed to free trade, here, the same policy, aided enormously by the creation of roads, railways and irrigation works, has led to an immense increase in the area under cultivation. In England technical and industrial education mean one thing, in India they mean something totally different. In England technical education is looked to as a means of increasing the skill and usefulness of her workmen so as to enable her to maintain the supremacy which her manufactures have long enjoyed in the markets of the world, in India technical education is looked to as a means, whereby manufacturing industries may be called into existence and employment found for her ever-increasing population. England mainly imports raw materials for her mills and workshops and food-stuffs for her people, whilst her exports are chiefly manufactured goods. India is at the other end of the scale exporting raw materials and importing manufactured articles. Technical education, it is hoped, will enable India to supply her own requirements more completely and will develop her internal trade at the expense of her external trade. That is, the surplus food now exported will be employed to feed that part of her population which will be engaged in manufacturing the articles now imported.

3. If these premises be accepted and their truth can hardly be doubted, it is evident that the task which lies before those who would direct technical education in India is much more difficult than that which has been faced in England and it is not to be wondered at that there has been hesitation in taking the initiative and distrust at the earlier results. The attempt has been made to develop technical and industrial education on the same principles and by the same methods as have been found most satisfactory in Western countries, but the result has been different and it would be difficult to-day to point to any industrial enterprise in the Madras Presidency that has been materially aided by the persons who have been technically trained. It is true that the College of Engineering trains special classes of men who chiefly find employment in the Public Works Department and there, year by year, it is acknowledged that the value of their work is increasing. But this is an exceptional case and is due to the fact that Civil Engineers like the members of other learned professions require at the beginning of their careers a specialized training which can be more thoroughly and more completely given in the quiet *regimé* of a college than amid the stress and turmoil of actual practical work. The Civil Engineers' professional work is much the same in India as elsewhere and the same methods of training may be and in fact are successful. With mechanical engineering and manufacturing work it is different and the men born and educated in India engaged in these occupations have either been trained in colleges such as Sibpore and the Victoria Technical Institute, Bombay, where the workshops are carried on as semi-commercial undertakings or have learned their trade in railway or other purely commercial workshops or manufactories. For the leaders of industrial enterprise a college course of instruction in science and its practical applications is almost essential, but it is quite unnecessary for those who must always form the great bulk of the army of industrial workers.

4. In Western countries such industrial and technical schools as have been started with the idea of running them more or less as commercial concerns have, I think, without exception proved failures. They had to compete with fully developed private enterprise and experience has shown that the effort was beyond them. In India the circumstances are different and the technical

schools must be started not to compete with existing local enterprise but with imported manufactured products of other parts of the world. Their object should be to lead the way in developing the material resources of the country and by the scientific combination of modern machinery and cheap labour demonstrate the possibility of these two factors being so employed as to counteract the disadvantages of a poor supply of fuel and the absence of the great iron industries. It is evident that the greatest prospects of success will be found in those trades in which hand labour still plays an important part in which the machinery employed is of a simple nature. For this reason it would be justifiable to start carpenters and blacksmiths' shops in any district where the local workmen are inferior and to run them on commercial lines supplying, however, only goods of a quality superior to the products of the bazaar. Where, however, as for instance in Madras, there are private workshops turning out high class work, it would be an unjustifiable interference with private trade to establish with the assistance of public funds rival institutions. It is an absolutely futile waste of energy and money to attempt in industrial schools to compete with the bazaar and their efforts should be entirely directed to either a much higher class of work than it is possible to procure in the bazaar or to the establishment of new industries not at present carried on.

5. It will be perhaps convenient to discuss the industries carried on at the School of Arts at the present time in the light of these observations. These are (1) carpet-weaving, (2) lacquer work, (3) pottery, (4) cabinet-making, (5) gold and silver smiths' work, (6) metal-work in brass and copper chiefly ornamental, (7) metal-work in aluminium, both ornamental and useful.

The first two compete with no private enterprise, the third very largely supplies the requirements of other Government departments on utilitarian side and makes no attempt to cover the ground already occupied by private enterprise, whilst in decorative and ornamental work it stands absolutely alone in Madras. In cabinet-making there is undoubtedly some competition with private enterprise but in the main the work turned out is of a more elaborate and ornamental character than private individuals would care to take up and most of the work done is sold for *export to England*. The amount of gold and silversmith's work done in the school is comparatively small and as it undoubtedly competes directly with private enterprise, no efforts are now made to secure orders and only as much work is done as is necessary for training the boys. The aluminium industry has been introduced into the country through the agency of the school and is an example of the kind of work which industrial and technical schools may with great advantage attempt. It would in this particular be possible to make a very considerable profit for a time out of the work, but the object so far has been to reduce the selling prices as low as possible consistent with making the department pay its own expenses. It therefore seems to me that so long as we do not deviate from the present practice it will be sound policy to do all we can to develop and extend the operations of the industrial side of the School of Arts, so long as they involve the Educational department in no more expenditure than is justified by the direct educational results. This means that the industrial side of the school must be run on commercial lines and a market found for its manufactures by the methods ordinarily employed by business men. If work is carried on on a large scale it will be possible to pay for the highest technical skill in the direction of the work and for the most perfect machinery and labour-saving devices so that it will be possible for the apprentices and students to obtain a far better training than they do at present and they will then be capable in the future of undertaking industrial enterprise themselves.

6. It will not be possible for the district technical schools to take up so many branches of work, but their object and efforts should tend in the same direction and as far as possible they should endeavour to improve the skill of their local artisans and open out markets for the sale of their productions. The industries which immediately suggest themselves to me as being most suitable are carpentry in its two branches, joiners-work and cabinet-making; iron work including blacksmith's work, fitter's work and such specialized branches as tool-making, cutlery and locksmith's work; metal-work in brass, copper and aluminium and pottery. Without the least doubt there are numerous other branches of industry which might with advantage be taken up, but to run them at all successfully something more than a local market will be required and it will be well to achieve success on a moderate scale before attempting a more ambitious programme.

7. It will by this time, I hope, appear perfectly evident that the views which I have gradually been forced to adopt with regard to technical and industrial education in this country are based upon the fact which I think must be regarded as of fundamental importance, viz., that in India technical education and industrial development must proceed hand in hand and not the one follow the other as usually been the case in other countries. Hence arises the necessity for putting trained and intelligent men in charge of these schools from the very beginning as it is to their efforts mainly that we must look for success. The higher the pay that can be offered them, the better will be the class of men that will be attracted and consequently the greater the prospects of success. A careful comparison of the rates of pay obtaining in other educational work and in other services compelled me to adopt Rs. 200 per month as the least amount for which even fairly satisfactory men could be obtained. If it be accepted that Industrial schools must as far as possible work on commercial lines, it certainly needs no lengthy argument to prove that the men at their heads must possess experience and business tact.

pay them ... *n this Presidency*

We must compete for them in the open marke... ...ving:—

done I fail to see how any real or effective work is ... ...be

technical education and industrial schools.

8. The lack of industrial enterprise in this country is partly due to the fact that ... competition of imported goods production must take place on a large scale. As a rule ... demand in any particular locality for a specified article is small, yet the aggregate for the whole Presidency may be very large. Hence it seems to me that if industrial schools are to meet with success there must be some central distributing agency, and I am inclined to think that this is a work which might in the first instance fully be undertaken by the authorities of the School of Arts. Let us suppose that one school makes locks, another cutlery, a third brass fittings such as handles, hinges, hat pegs, etc., a fourth buttons, a fifth ... and ornamental iron work and so on. Then to bring these prominently before the publ... extensive advertisement is necessary and this can be most cheaply and effectively done ... central agency. It is matter of common knowledge in commercial circles that the c... production from 30 to 50 per cent. must be added to cover the cost of selling and it is therefore a matter of supreme importance in the development of native industries that such charges should be reduced to the minimum possible and in this respect I think the chief industrial institution of the Education Department might be made to render exceedingly valuable assistance.

Note by Mr. H. A. Sim, I.C.S., on Technical and Industrial Education, dated 23rd March 1899.

I will put the case *very* shortly, the literature on the subject is already too voluminous.

2. All seem agreed as to the *need* for it: even in Europe, where the idea is mainly to *improve* existing industries: still more so in India, where the industries have also to be *created*: even in England, where there are *many* occupations open to the "B.A.": still more so in India, where there are practically only *two*, Government service and the Bar.

3. As to its *method*, the English and German schools divide the subject into *principles* and *practice*, and "plump" for the former. The Technical Instruction Amendment Act of Scotland, 1892, defines the subject as—

"(*a*) '*Technical instruction*' means instruction in the *principles* of science and "art, applicable to industries, and in the application of special branches of science and "art to specific industries or employments. It shall not include teaching the *practice* "of any trade, or industry or employment, etc.

"(*b*) '*Manual instruction*' shall mean instruction in the *use* of tools, processes "of agriculture and modelling in clay, wood, or other materials."

Note.—The italics are mine.

4. In other words, the subject is divisible into the teaching of—

(*a*) The *theory* of the various arts and industries.

(*b*) The *practice* of them in the actual workshop.

In England, as I have said, they "plump" for the former, viz., *theory*, the idea being that boys so trained would *improve* on existing methods.

In India Mr. Chatterton gives reasons for voting for the latter, viz., *practice*. He says: "*In England*, the people are wealthy and industrial enterprise has reached its "highest development and most perfect organization. In *India*, the people are poor, "and industrial enterprise is practically confined to the individual craftsman. *There*, "agriculture has been sacrificed to free trade; *here*, the same policy has led to an "immense increase in the area under cultivation. In *England*, technical and industrial "education mean one thing; in *India*, they mean something totally different. In "*England*, technical education is looked to as a means of increasing the skill and "usefulness of her workmen so as to enable her to maintain the supremacy which her "manufactures have long enjoyed in the markets of the world; in *India*, technical "education is looked to as a means whereby manufacturing industries may be called into "existence, and employment found for her ever-increasing population. *England* mainly "imports raw materials for her mills and workshops; and foodstuffs for her

are chie[illegible]anufactured goods. *India* is at the other [illegible]xporting raw materials and importing manufactured articles. [illegible]cation, it is hoped, will enable *India* to supply her own requirements [illegible]ompletely and will develop her internal trade, at the expense of her external trade."

This is important, as constituting a reason for our not following England *too closely* in regard to this particular matter of *principles*, instead of *practice*.

5. We have three apostles of technical education in Madras—

(1) Mr. Adam, *alias*, the Victoria Institute and Mr. Crole.
(2) Mr. Spring.
(3) Mr. Chatterton.

(1) *Mr. Adam*, represents the English school—viz., educate a boy in *general* education first; then teach him technical *theories*; and then let him take to the *trade*, itself.

(2) *Mr. Spring* is for teaching *everybody*, a certain amount of drawing, designing, etc., to make them more handy, and to act as a sort of antedote to too much literary work. Boys who had a taste for mechanical or industrial work would show their taste at this stage, and would be drafted off to special technical schools of low grade; whence the best of them would proceed to finish their education at higher schools, such as the Public Works Department College, the Agricultural College, etc.

(3) *Mr. Chatterton* is for starting special industrial schools, dealing with particular industries and attended by the existing class of artisans. The ground has been somewhat cleared by Your Excellency's talk with Mr. Arundel, and practically accepting his suggestion that Mr. Chatterton should be put on special duty to start technical education; all that is needed, now, is for Government to lay down very generally, the objects which he should aim at, and the lines on which he should proceed.

6. *Our existing system* is good as far as it goes, but it goes a very short way: it is to start *examinations*, the idea being that *examinees* would start up of themselves, if Government provided the *examiners*. A very complete scheme of Government Technical Examinations has, therefore, been drawn up, which, except that there are exceedingly few *examinees*, is sound as far as it goes, and will form a portion of any scheme that may now be decided on.

7. The idea of the examination was to provide a means for granting money aid to those schools which sent up successful candidates, and for granting diplomas to qualified students, on the strength of which private firms and trades might safely employ them.

8. All this is sound enough, except that it fails to recognize that the individual who goes in for examinations in this country is not the artisan who "means business," but the Brahman, who simply uses it as a step towards Government service: as this particular examination did not lead to a Government appointment, the Brahman has kept clear of it, and the artisan has not taken to it; so that the number of examinees is small.

9. *Mr. Spring's scheme* is sound, viz., that *all* boys in *all* schools should be taught drawing and general handiness: it will improve a boy's handiness, it will give those who have a "turn that way," a chance of showing that they are better suited to an industrial training than to a literary one; and — a very important point — it will reduce "cram" automatically. A boy *cannot* be crammed with too much literary book work, if he *has* to spend an hour or two in the day, knocking about with tools, and drawing apparatus. Your Excellency has recently denounced "cram"; it is difficult to imagine a better and more automatic means of reducing it than this one of Mr. Spring's, of forcing into the literary curriculum, a certain mixture of healthy *mechanical* training.

10. *Mr. Chatterton's* system is sound also in that it is eminently *practical*: it deals with actual industries, and with the actual men, who now are, and who in future will, actually carry them out. Not merely with a few high caste students, who will pass certain examinations, and look well on paper; but in fact, have nothing whatever to do with the *trade*.

[illegible] *this Presidency*

[illegible]ving:—

11. *As the general* [illegible] *Industrial* [illegible] therefore, I would suggest to Your Excellency [illegible]omething like the [illegible] [illegible]he

(i) *The existing scheme* of Government Examinations, and grants-in-aid to [illegible] continued.
(ii) *Mr. Spring's idea* of a general training for *all* boys, in *all* schools, in drawing, carpentering, etc., to be adopted.
(iii) *Mr. Chatterton's* idea of special industrial schools *cum* workshops, for the more practical training, to be adopted.
(iv) The provision of trained teachers, the extension of Municipal and Local Fund schools—in connection with Mr. Chatterton's idea—and the organization of the Civil Engineering College, the Agricultural College and other similar institutions, as high class finishing schools, to be gradually elaborated.
(v) Mr. Chatterton to be put in charge as Director of Manual training (under the Director of Public Instruction).

12. A boy's training would then take something of this direction. He would begin in a primary school and learn the 3 R'S. and a certain amount of drawing, designing, carpentering and playing with tools, generally. He would pass on to a special industrial District Board school, where he would learn something of an actual trade; and he would, if promising, finish up at a Government College like the Civil Engineering College; after that, he would either get a Government appointment, or go into trade. Government, on the other hand, would help by providing trained teachers, aiding District Board schools by money grants, keeping up the high class Colleges and providing examinations and diplomas.

13. The thing is, of course, not really so simple as all this: it bristles with difficulties, *e.g.*, the working of the *real* artisan in, instead of the sham one; but these Mr. Chatterton would work out, as he goes along. Only, *some* sort of general lines are needed, if he is to have a fair chance of getting along at all.

14. If your Excellency thinks the general idea looks feasible, on the surface, I would ask permission to talk it over with Mr. Arundel, before your Excellency "notes" on it.

There are several draft Government Orders dependent on the orders, which may be passed in regard to Technical education generally: but they will come up, later.

Demi-official from A. Chatterton, Esq., to the Hon'ble Mr. A. T. Arundel, I.C.S., dated 3rd April 1899.

I enclose the memorandum on "the development of industries in the Madras Presidency" which you asked me to prepare.

With regard to the aluminium industry the result of our recent stock-taking shows that we are about Rs. 12,000 to the good on the result of the year's work. The total sales were Rs. 50,800.

By to-day's mail I have received an order from a big English firm for hand-made aluminium goods and a promise of very large orders to follow if the work is satisfactory. I am quite certain that it is merely a question of business skill and trading on a big [illegible]ough scale to establish an export trade in hand-made goods.

ENCLOSURE.

The development of industries in the Madras Presidency.

The question of Technical education in the Madras Presidency is inseparably connected with that of establishing new or improving existing industries. Excluding the men employed in a few establishments conducted on European models, the bulk of the artisan population work in small gangs in their own houses and use few labour-saving appliances. The most important trades are metal-working, weaving and building, each of these being sub-divided into a considerable number of branches. For instance, the metal-workers include blacksmiths, fitters, locksmiths, goldsmiths, silversmiths, coppersmiths, brass, tin, and bell-metal founders and the plate workers. The weavers include all those who produce fabrics made from silk, cotton and coarser materials. The principal branches of the building trade are masonry, brick-burning, brick-laying and carpentry. In the latter may be included also carriage-building and furniture-making. With the exception of some primitive iron smelting in certain districts there is no metallurgical industry in the Presidency and mining is confined to the recently-established manganese mines in the Vizagapatam district.

are chie[illegible]anufactured goods. *India* is at the other [illegible]xporting raw materials and importing manufactured articles. [illegible]cation, it is hoped, will enable *India* to supply her own requi[illegible] completely and will [illegible]tion Departmaternal trade, at the[illegible] trade."

[illegible]aining certain special [illegible]ions in Madras and subsidizing by grants-in-

The number of industrial schools established either by Missions or District Boards. Of the Government institutions located in Madras the most important is the College of Engineering which mainly trains students for the various branches of civil engineering practised in India. It possesses very good workshops and laboratories, but no special courses of instruction in mechanical engineering are given and at present it exercises practically no influence over the industries carried on in the Presidency. The School of Arts is a drawing school with an industrial side and till recently trained a few ornamental metal-workers, wood-carvers and carpet-weavers. Pottery, tiles and firebricks are also made there, the former mainly for the Medical Store Department. I am not aware that the School of Arts has in any material way contributed to the advancement of any industry, though it has preserved and possibly improved certain indigenous methods of decoratively treating copper and wood.

The aided industrial and technical schools have either been founded by Missions to enable Native Christians to acquire a knowledge of certain trades or by District Boards in the hope that they would improve the handicraft of the artisans. So far I cannot see that they have done any good except break down caste restrictions and throw open the trades taken up to every class of the community. This is in the main due to insufficient funds having been allotted for their upkeep, to instruction in too many industries having been attempted and in some instances to placing them under superintendents with no special qualifications for the work. It can scarcely be questioned that under more favourable conditions these schools could be made much more efficient and would then in time turn out a superior class of artisans. The industrial development of India is retarded enormously by the fact that local productions have to compete in a perfectly open market against those of the splendidly-organized establishments of Great Britain and America where the natural conditions for carrying on manufacturing operations are so much more favourable. By the imposition of high tariffs Continental Europe has made great progress, but if the duties were removed, only in a few special lines would Europe be able to hold its own against English and American exports. In India the redeeming features are the extremely low cost of living which enables the working classes to live comfortably on from one-fifth to one-tenth the wages paid in Europe and the adaptiveness and dexterity of the artisans. Something, perhaps much, may be done by the Educational Department if their efforts are concentrated on improving the general intelligence of the artisans and providing facilities for developing to its utmost their hereditary skill. It will probably only be possible to take up one or two special industries at a time and it would seem to be essential that they should be worked on a commercial scale, to prove the value of the innovations, to afford sufficient scope for the training of a large number of men, to diminish as much as possible the expenses and to excite private competition as early as possible. The aluminium industry which has been carried on for the past twelve months at the School of Arts is an example of the kind of work which can be done. In this case a metal superior in many ways to brass and copper has been introduced into the country, some hundreds of men have been trained to work with it, a market has been created for the finished goods and, if the same rate of progress continues, in a few years it is not unlikely that the metal will be extracted in the country and an entirely new and important industry started, which will give employment directly and indirectly to many thousands of people. So far, only a start has been made and it would be well to spread the industry all over the country and to utilize for this purpose such of the existing industrial schools as are suitably situated. Complete success will only be attained when the people generally use the metal for such purposes as experience shows it to be best adapted and when the working of it into suitable shapes is carried on in every bazaar. Owing to peculiar local conditions, to a general distaste for machine-made wares, to the heavy freight charges on the bulky-finished articles, it seems unlikely that the industry will be concentrated in a few centres or that it will offer great attractions to capitalists. Metal-working has survived up to the present day as a purely indigenous industry in the hands of small men, and though it is probable that individuals will not find it very profitable to work the new metal as they now do brass and copper, yet small combinations can raise enough capital to do so with profit and will give rise to a class of the petty artisan capitalist who in the long run will probably form the backbone of industrial enterprise in India.

The work connected with the introduction of aluminium affords an excellent opportunity for initiating a serious effort on the part of Government to ascertain what can be done throughout the country to improve the condition of the artisan population, to foster local enterprise and encourage the investment of floating capital in productive concerns. Natives are exceedingly shy about putting money into business; they do not understand, and they experience great difficulty in getting disinterested technical advice. I have often received requests for such assistance and I am inclined to think that in an indirect way much useful work might be done if the public could obtain the services of a Consulting Engineer whose opinions would be absolutely imbiassed by pecuniary motives. It would be necessary to charge fees proportional to the work involved in rendering assistance, but the fees so earned should be entirely credited to Government. No responsibility could be accepted as to the results which might follow the adoption of such advice, but even under such conditions it would probably be eagerly availed of. At the outset it seems impossible to indicate in more than the most vague way what industries can be assisted or new trades started. To throw open new fields for the employment of large masses of the population is the object to be aimed at and that can be accomplished in any or all of the following three ways:—

[illegible] this Presidency

[illegible]ving:—

[illegible]he

(1) By [illegible] creating [illegible] hand [illegible] which [illegible] industries [illegible] carr[illegible] [illegible]mples of [illegible] as must be made by [illegible] work, oriental carpets and a large number of miscel[illegible]ous artistic [illegible] the natives of India excel but of late years the work exported has been of ver[illegible] and it is now difficult to obtain the high prices formerly given for good specimen[illegible] way the School of Arts in Madras has for years past, sold most of its outturn for export, and[illegible] proper business arrangements for its disposal there is no reason to doubt that gradually a very much larger quantity could be produced and sold in Europe, America and Australia. The demand for Indian carpets of good design is far in excess of the supply, but it is apparently not worth the while of any private individual to stimulate production. Government intervention for a year or two, if successful, would undoubtedly excite private enterprise. If the aluminium industry succeeds and the metal is made in India, it will most certainly give rise to a very large export trade with the countries further east, and very probably also with western nations in all such goods as cannot be profitably made by machinery.

(2) By making in the country, goods now imported. Greater encouragement might be given to the Engineering firms already established by placing with them orders which are now sent to England. Although raw materials are more expensive out here, labour is much cheaper and if different firms were encouraged to take this special lines of work, it is probable that they would find it possible to compete in quality and [illegible] by inferior quality imported goods. In Madras at the Engineering College there is a thoroughly equipped [illegible]ory for engineering materials and it is therefore quite possible even now to ensure that [illegible] with [illegible] of the materials employed shall be fully up to the specifications agreed upon. In Madr[illegible] [illegible]gement fully equal in quality to English, German or Belgian brands is made, and if a [illegible] manufacturers is imposed by a proper system of testing, there is absolutely no reason w[illegible] t should ever be imported into this Presidency. In the Industrial schools which have [illegible]d or will be started in the future, the manufacture of a great variety of articles might be tri[illegible] perimentally and, where success is achieved, Government could render invaluable assistance by placing orders and making it generally known that such things can be produced on a commercial scale. It would be unwise without careful enquiry to definitely propose any special manufactures, but such articles as locks, bolts, brass hinges, small iron forgings and castings, knives, buttons, card board boxes and many others suggest themselves as offering prospects of success. Such things are now produced by machinery on an enormous scale and commercial success would entirely depend on being able to work in a big way with practically the whole of India as a market. Much more therefore depends upon the exercise of business tact and skill than has generally been assumed in the numerous discussions that have taken place on this subject. It is no use making goods and waiting for people to come and buy them: they must be advertised and exhibited and their sale pushed by all the means so well-known among commercial men.

(3) By ascertaining, by means of practical experiments on as large a scale as financial considerations will permit, the effect which recent advances in science have made on the prospects of utilizing the natural resources of the country. During the first-half of this century many endeavours were made to exploit the mineral wealth which undoubtedly exists, but from various causes they all failed. Since then extraordinary developments have occurred and it is possible that modern technical skill might succeed where the older methods and appliances failed. The most potent addition to our resources is electricity and it is absolutely certain that at some time or other in the future the water-power available in connection with the irrigation storage works will be usefully employed in generating electric currents. How best to make use of this electric energy, is the question which calls for solution and it is a fit subject for research in the technical laboratories that have been or will be established in India. Paradoxical as it may seem, it is much easier to obtain capital for large schemes which offer fair prospects of success than for small projects which are in the least degree speculative. In India it seems hopeless to start the iron trade on the scale it is pursued elsewhere and small capitalists dare not touch it, till certain practical questions have been answered. It might be judicious on the part of Government to take the matter up, as the benefits which would accrue from a successful issue, would be very great. Chemical industries might under certain circumstances be carried on here with great success, if Government support and encouragement were actively accorded, but a vast mass of experimental work will first have to be undertaken before any commercial undertaking could be launched. The calcium carbide industry, the alkali trades, the manufacture of sulphuric acid, the electrolytic production of copper are possible future industries depending so far as can be seen at present, on a cheap supply of electricity and it might be possible for Government to render great assistance in the experimental stages. A technical branch of the Education department avowedly established with the object of advancing the material prosperity of the country, starting on a comparatively small scale might gradually come to exert an important influence in many directions and, if success attended its earlier efforts, might be justified in engaging the services of experts in various industries and operating them till such time as their commercial feasibility was thoroughly tested. In the first instance efforts should be concentrated on the improvement of existing institutions and upon the firm establishment of the aluminium industry. This will certainly occupy some

A. T. A[RUNDEL].

...occur and
... as close touch as
...nity chie... when possible and to avail
...and experie... waste of time and money on useless

For the last twelve or fifteen years there has been in operation a scheme of Government Technical examinations for which now a considerable number of candidates annually appear, chiefly from the schools of art, the technical, commercial and industrial schools, and the College of Agriculture and from that class of miscellaneous students who hope to find employment in the various subordinate Engineering services. It is difficult to estimate their effect upon the country. To some extent they have no doubt stimulated the movement in favour of technical education, but owing to defective teaching it is very doubtful if they have had much real influence and it is certainly impossible to point to any specific result they have achieved. If the improvement of the industrial schools be vigorously taken in hand, it will certainly be desirable to revise this scheme of examinations as their main use is to test the quality of the teaching work done in the different schools. It would be desirable to place them under the technical branch and to revise the syllabuses where experience has shown that they are defective. At present they serve to test the work done in the School of Arts and the College of Agriculture and it is difficult to understand why they should not be made to equally serve for the College of Engineering. That institution stands too much by itself in the Education Department and is regarded too much as an adjunct of the Public Works Department. Without impairing in the least degree its efficiency as a training school for the Public Works Department it might be with advantage connected more intimately with the general technical education of the Presidency. By making the college students appear for the Government Technical examinations the defective teaching in the mufassal schools would become more apparent and in time when their educational status was raised, each in its own particular line would react on the college in Madras and a healthy rivalry would be established, which is at present entirely absent. No doubt much opposition would be offered to this proposal and there are certain minor difficulties to be overcome, but it is desirable that the Engineering College should be expanded and brought into more intimate association with the minor provincial schools.

Not a few educational authorities are strongly in favour of the introduction of manual training into the high school and collegiate courses of instruction. The principal difficulty is to provide suitable teachers, and it is obvious that no good could come of setting up carpenters' shops in secondary and higher schools unless competent teachers are put in charge.

For years past the students of the Engineering College have been put through a course of special manual training and experimental work in the college workshops and as the numbers have rapidly increased they now offer inadequate accommodation and a considerable extension is required. If this was carried out and if a competent English instructor, well versed in the theory and practice of manual training, was procured, it would be quite possible to utilize the college workshops for special courses of instruction in manual work for those who ultimately would be required to teach it in the secondary and higher schools of the country.

Any scheme of technical education based upon the employment of special European experts must prove exceedingly costly and is not likely to be very successful. The conditions in India are so completely different from those that prevail in Europe, that experience gained there is of but little use out here and it requires years of residence here before the difference is fully appreciated. It would be much cheaper and better in the earlier stages at any rate to work as far as possible with such expert knowledge as is already available. What is wanted primarily is the improvement of native methods of working, and not their abolition and the introduction of new methods which are probably unsuited to the people of the country. Native processes are the outcome of many centuries of practical work and it is perhaps doubtful if much can be done to improve them. Yet no real attempt has been made as it is not worth the while of any one to spend his time in trying. The changes must be of a very simple character so that any one can adopt them and, if that be so, the inventor is left without any reward for his efforts as even, if he patented his improvements, it would be impossible to collect royalties from those who used them. The offer by Government of adequate rewards for any really effective inventions or improvements, and the test of their efficiency would be the readiness with which they were adopted, might direct attention to native industries and result in extremely useful work. Of late years, waterlifts have been the subject of many Indian patents but without any practical result, although a few promising ideas have been evolved. The problem is an extremely complex one and could only be attacked with any prospect of success by those who are well acquainted with the ways of the ryots and their methods of working. By some who have considerable experience of the weaving trade with hand looms, it is thought that great improvements might be made which would greatly increase the outturn of work and enable the hand weaver to compete on more favourable terms with the steam weaving factories. The irrigation of valuable crops by water raised from wells by steam or electric power would be very profitable in some places, if it could be started by native land-owners and worked entirely by native agency.

...this Presidency
...ving :—
...which bears upon ... Institution ... tion of ... be
issue.

The standard of technical skill and knowledge among the artisan classes varies ... and it should be the duty of the technical branch of the Education department, working through the agency of the industrial schools, to effect a general levelling up throughout the Presidency. This could be done by introducing new trades into backward districts and employing the best workmen from the most advanced places to instruct. At times much useful work could probably be accomplished by inviting the assistance of mechanical engineers engaged in railways and private firms who for adequate remuneration would no doubt be glad to place their technical knowledge at the disposal of the Department. Under the most favourable circumstances technical education has required the outlay of very large amounts of money and in India, where it means so much more than elsewhere, it is likely to be a heavy drain on the funds which can be devoted to education unless every local resource of this kind is called into requisition and made use of.

The working scheme now proposed is unavoidably vague and indefinite and is essentially a tentative one; to be developed as time goes on in whatever directions subsequent experience may indicate as best calculated to bring about the ends in view. A large amount of work has been done during the past few years and in the beginning an attempt will be made to consolidate and strengthen the existing institutions. The College of Engineering and the School of Arts should be reformed and extended by degrees so as to bring them into intimate association with the general technical education work of the presidency. This however would not involve any elaborate schemes of reorganization. All that is required is to make their constitution sufficiently elastic to enable their resources to be available without delay for special work either by way of instruction or experiment. The change in the method of conducting the College Examinations is the only serious alteration proposed but the staff will require strengthening in proportion to the extra amount of work thrown upon them.

A. T. A[RUNDEL].

As matters now stand it is, I believe, in contemplation to place me on special duty for a time to take charge of this work. During the last ten years except when I was attached to the Public Works Department and when on furlough I have practically acted as Inspector of Technical schools and visited most of them several times. During the last sixteen months I have spent several hours every day at the School of Arts mainly in connection with the Aluminium industry, but for over six months in charge of the whole school. This in addition to my ordinary work at the College of Engineering has been a heavy strain and could not continue indefinitely. The proposed expansion of the technical education side of the Department would increase the work enormously and it would be necessary to relieve me of all direct teaching work in the College of Engineering. For some time past the workshops of that institution have been separated from the rest of the College and have been under me in a *quasi* independence of the Principal. From what I have already said it will be seen that I regard these workshops and those at the School of Arts as important factors in the programme proposed and I therefore do not think it would be advisable to relieve me of all control over them. Tentatively I might continue in charge of them as at present as although it would be inevitable that I should occasionally be away from Madras for weeks at a time yet the work could, I think, be carried on satisfactorily by my workshop Superintendent who is an experienced English mechanic. With regard to the School of Arts I have already sent in an official proposal to separate the metal working trades and start an independent school of metal work. This could be done or the whole of the industrial side of the school could be placed under me with a capable native assistant Superintendent in charge. The Superintendent of the School of Arts would then have more time to devote to instruction in the art classes which would be an advantage as they are capable of considerable improvement. In Calcutta there are no industries carried on in the School of Arts and the work of the art students is immensely superior to that of Madras, the reason undoubtedly being that the Superintendent has more time to devote to it. The connection between the art and industrial sides of the school would have to be as close as now and the Superintendent with more time at his disposal would be able to improve the designs of work carried out in the industrial side. Whatever the arrangement be that is finally adopted, it ought I think to provide for the training of some one who could take my place and carry on the work at any time and obviously he must be attached either to the College of Engineering or the School of Arts and he must be given frequent opportunities of gaining practical experience of the Indian industries.

If Mr. Chatterton were put on special duty his connection with the workshops of the Engineering College for the purposes of his special work would have to be arranged by the Director of Public Instruction in communication with the Principal of the College.

A. T. A[RUNDEL]—8-6-99.

It is premature to think of this—Mr. Chatterton's successor. His own existence for special employment and possibly for a special appointment afterwards must first be justified.

A. T. A[RUNDEL]—8-6-99.

In conclusion if Government adopt these suggestions and the work connected with them be entrusted to me, I should start with the following definite objects in view :—

(1) The development of the aluminium industry which would take me all over India and give me opportunities of becoming acquainted with the industrial conditions outside the Presidency;

xisting industrial schools and the establishment,

evelopment of an export trade in connection with the work of the School of Arts assal schools;

(4) The superintendence of the Government technical examinations; and

(5) The establishment of a manual training class in the College of Engineering Workshops if such be considered desirable.

This seems to be a sufficient programme for three years' work and possibly by the end of that time other developments will have taken place.

Demi-official from the Hon'ble Mr. D. Duncan, Director of Public Instruction, to the Hon'ble Mr. A. T. Arundel, dated 8th May 1899.

I return Chatterton's interesting letter with the general purport of which I agree.

I have long had the question of industrial and technical education under consideration and I would be glad before I go to do something more to advance it. Letters of mine on the subject generally and on the School of Arts specially have been with Government for, I think, more than three years, and up to now I have received no orders on them. From various outside sources I learn that the whole question of technical and industrial education is under the consideration of Government and now and again vague hints are thrown out as to the measures that are contemplated by Government. But officially I am kept in the dark as to the intentions of Government.

I should like to see the question of the staff and establishment of the College of Engineering settled before any definite conclusion is arrived at as to laying new duties on Mr. Chatterton's shoulders. The College of Engineering has already suffered owing to the time and energy he has had to devote to aluminium.

See memorandum by Mr. Chatterton *supra*.

The papers relating to the aluminium industry originated by Mr. Chatterton lead the way to a larger subject.

2. The development and encouragement of technical arts, trades and industries has for nearly ten years been a subject of solicitude with Government which in 1893 issued a notification declaring its readiness to hold examinations and issue certificates of proficiency in about 88 different subjects ranging from bread-making and needle-work to veterinary science and electro-metallurgy. What may be called the professional side has been taken up as regards a number of subjects by various educational bodies: Civil Engineering by the Civil Engineering College; Biology and Sanitary Science by the Medical College; Agriculture by the Agricultural College; Shorthand and Type-writing by certain schools and so forth.

3. But little however has been done to touch the artisan class—except perhaps by a few carpentry classes in different parts of the country,—and almost nothing in the way of developing any enterprise, both industrial and commercial, which gives prospect of employment to a considerable number. In this respect the various Railway Workshops, Public Works Department Workshops, various spinning mills and such firms as Massey & Co. have accomplished pretty nearly all that has been done.

4. Mr. Chatterton however in his leisure time and at the outset with his own funds and at his own risk has introduced the aluminium industry which promises to d employment for a large number of work-people and agents and to supply the wants of the people generally in the matter of household and cooking utensils and also the requirements of various departments of the Government. Mr. Chatterton's turn-over will be, I believe, about half a lakh of rupees this year—the first—and will exceed a lakh in 1899–1900. The industry is at present carried on under the same roof with the School of Arts which runs the risk of being stifled in consequence. There can be no question that the industry is one that should be fostered and encouraged by Government and immediate steps must be taken to give it special quarters of its own. This can be done by allotting to it the back part of the School of Arts compound where the necessary sheds can be built.

5. But a more important question now arises. Mr. Chatterton has hitherto been running this extensive business in his spare time, and I cannot but fear that his legitimate work as Professor in the Civil Engineering College must inevitably to some extent suffer. Now it is clear that the extended business contemplated cannot be controlled by Mr. Chatterton in this way. The step that I think Government should now take is to withdraw Mr. Chatterton altogether from the Civil Engineering College, and taking advantage of his special aptitude in matters relating to technical trades and industries, put him for a term of, say, three years on the special mission of restoring, organising and developing those that afford the best prospect of success in this Presidency, particularly in metal-work and connected industries, such as native smelting furnaces, alloys, methods of casting. It would of course be necessary for him to draw up in conjunction with the Director of Public Instruction a programme of work. He would travel freely over the Presidency enquiring into his special subjects and at the same time extending the aluminium industry.

Yes.
A. E. H[AVELOCK].

I fully concur.
A. E. H[AVELOCK].
H. M. W[INTERBOTHAM].

6. He might, with the previous sanction of Government, advise any firm that may, like Messrs. Best & Co., contemplate utilizing the Periyár falls for industrial machinery.

Yes.
A. E. H[AVELOCK].

7. In the course of three years, the aluminium industry will have so far developed that it may safely be left to private enterprise which is of course the end to be desired: and at the end of that period Government would have ascertained through the best agency at their disposal what further industrial developments appear to be feasible. If these are considerable, it might be advisable to continue Mr. Chatterton on the duty for a further term or even to make a permanent appointment. If the scheme thus roughly outlined meets with the approval of my Honourable Colleagues, it would have to be considered and elaborated by the Acting Director of Public Instruction and the sanction of the Government of India would of course be necessary. I would propose that Mr. Chatterton should draw the salary to which he is entitled in his department and a deputation allowance of, say, Rs. 5 per day, or Rs. 150 per month, besides travelling allowance at the usual rate. The question of technical trades, arts and industries has been long under discussion and consideration. I think the time has come to try and solve the numerous difficulties by action; and the prospects of at least some limited success are considerable.

Yes.
A. E. H[AVELOCK].

It further seems to me that Mr. Chatterton deserves a substantial recognition from Government for the time and labour he has given and the pecuniary risks he incurred in starting the aluminium industry. I would propose that he be given an honorarium of Rs. 1,500 for which the sanction of India would have to be obtained.

I agree.
A. E. H[AVELOCK].
H. M. W[INTERBOTHAM].

A. T. A[RUNDEL]—18-3-99.

The disposal of Messrs. Best & Co.'s letter (C. No. 1635) must depend on the action taken regarding Mr. Chatterton. If the latter is not to be given the special employment advocated above, he must drop the aluminium work and confine himself to his duties at the Civil Engineering College. Messrs. Best & Co. could then be left to do what they could with the business. If, however, Mr. Chatterton is employed as proposed, Messrs. Best & Co. must be told that Government considers the aluminium industry still requires fostering and developing before it is entirely left to private enterprise, but that Government will be glad to see private enterprise engaging in the business.

Messrs. Best & Co. should be so told.
A. E. H[AVELOCK].
H. M. W[INTERBOTHAM].

Mr. Chatterton cannot, while in the service of Government, be a Consulting Engineer to the firm or member of an Advisory Board.

As Messrs. Best & Co. say they are Agents of the British Aluminium Company, I may as well note here that I hold some shares in that company.

This note may as well be kept confidential until action is decided on.

A. T. A[RUNDEL]—20-3-99.

I accept the Hon'ble Mr. Arundel's proposals—understanding that they cover approval generally of the scheme set forth by Mr. Chatterton.

A. E. H[AVELOCK]—12-6-99.

I agree, and have no useful remarks to offer. The file only reached me yesterday.

H. M. W[INTERBOTHAM]—28-6-99.

The Assistant Secretary has put up a draft Government Order and a draft to Government of India regarding Mr. Chatterton's deputation. I am not however sure whether the Honourable Member intended the Government Order on the subject to issue now before India's sanction is received and further whether it was intended that the scheme should be considered and elaborated by the Director of Public Instruction before addressing the Government of India.

As the Acting Director of Public Instruction is mentioned it would seem that it was intended that this elaboration should take place at once.

C. J. WEIR—4-7-99.

The Government Order must of course wait until sanction has been obtained for Mr. Chatterton's special appointment. The only order now necessary on G.O., No. 1252, dated 20th December 1898, and any currents from the Director of Public Instruction on the subject is that the Government of India be addressed.

2. I don't like the form of the draft letter.

The argument is as follows:—

This Government has for a long time had under consideration the development of technical trades and industries. Here amplify, show what little has been done in a few carpentry classes, in teaching drawing, in providing various examinations. All this is quite incommensurate with the magnitude of the subject and on the examination side is professional and theoretical rather than practical and leaves the development of the artisan and his industries quite untouched. An opportunity has now arisen for ascertaining the wants of the people, the indigenous industries that are capable of development and for increasing the demand for, and improving the quality of, the work of the native artisans. Then explain what Mr. Chatterton has been doing in aluminium, the demand for the articles, his special fitness for work of this kind, the way the aluminium industry requires him to tour to industrial and commercial centres, and thus ascertain existing conditions and capabilities. Then draw the conclusion that a practical solu[illegible] of the question of technical trades and industries

promises to be found in putting this expert on special duty for a period of thre[illegible]
By that time [illegible]uminium industry may be left to private firms, and it [illegible]
known wh[illegible]atterton should be permanently employed on technical
and industries or whe[illegible]r the attempt to develop these must be attacked from an[illegible]
side. The letter to In[illegible] should be redrafted on these lines, properly filled in.

A. T. A[RUNDEL]—6-7-99.

The draft letter to Government of India is put up. I have suggested some alterations in pencil. The delay was caused by getting papers from Madras.

C. J. WEIR—24-7-99.

See corrections made.

A. T. A[RUNDEL]—26-7-99.

H. M. W[INTERBOTHAM]—28-7-99.

A. E. H[AVELOCK]—28[illegible]99.

[G.O., Nos. 504, 505, Educational, dated 5th August 1899.]

Gl. Cor. 500—28-10-97.

Office of the Director of Public Instruction,

Madras, 4 Nov 1898.

Dewan Bl from the Hon'ble Mr. D Sumner to the Hon'ble Mr. Chatterton

My dear Arundel

I am sending you a memorandum drawn up the day before yesterday by Chatterton. Before you visit the school of Arts, you may like to know something as to what is being done in aluminium work.

12

From the D.P.I. No 14180 dy 15 Dec 1898

Educational (1898) Department

CURRENT No. 18

From Orders

Please put up again in 3 days in Finl

I am sending back

17/12/98

Thro' Finl

From The Director of Public Instruction Madras

No. 14180

Dated 15th December 1898

Received 16—12—98

Registered

Enclosures 1

Spare copies

SUBJECT.

Submitting with reference letter from Mr. Chatterton applying for an allotment of Rs 15000 for the aluminium for the current year.

Mr. Chatterton applies for an additional allotment of Rs 15,000 on account of the aluminium industry in the School of Arts. The sums already allotted amount to Rs 30,000 - vide G.O. no 518 Ed dy 18-8-98 - 7 Enclg - A & G.O. no 688 Ed dy 5-11-98 - 7 Enclg. B.

He also recommends that a provision of one lakh be made in the budget for 1899-1900 on account of the industry. Only a provision of Rs 30,000 has been made in the budget now under issue in the Finl Dept.

M Secy Orders are solicited.

17-12-98 With regard to the additional allotment asked for, the D.P.I. states that no savings are available in the current year's educational budget. The Finl Dept may be asked whether it can sanction it from any anticipated savings.

DESPATCHED 16 DEC 1898

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

GOVERNMENT OF MADRAS.

EDUCATIONAL DEPARTMENT.

READ—the following paper:—

From the Hon'ble Mr. D. DUNCAN, M.A., D.Sc., Director of Public Instruction, Madras, to the Secretary to Government, Educational Department, dated 1st June 1897, No. 5851.

In its Order, No. 813, Educational, dated 25th October 1894, Government observed, with reference to Mr. Adam's suggestion that Government should undertake an industrial survey of the Presidency, that Mr. Havell had visited and reported on the industries in fifteen districts between 1884 and 1888, and that further action in that direction seemed unnecessary. But I was required to consider whether the information available in Mr. Havell's reports suggests to me the advisability of taking measures for the development and improvement of any of the local industries referred to by that officer, and my attention was again drawn to the subject in paragraph 17 of G.O., No. 471, Educational, dated 7th June 1895. I thought it advisable to defer my reply to Government till final orders had been passed on the reorganization of the School of Arts and the future of the Victoria Technical Institute. As it is uncertain when final orders will be passed on those two institutions, I have decided not to put off any longer my reply.

2. Mr. Havell made four tours during 1884–85 and the three succeeding years, visited the fifteen districts named in the margin, and reported on the arts and industries carried on in these districts. Some of these reports do not appear to have been communicated to my office, but I have obtained a loan of them from the Board of Revenue. A few of the industries reported upon are carried on only by one or two men or by one or two families, and are not therefore of importance to the community as a whole, or even to the inhabitants of a single district. The chief industries and the districts in which they are followed to any considerable extent, as I gather from Mr. Havell's reports and their appendices, are summarized hereunder. No particulars are given of the industries in the town of Madras and the district of South Canara :—

North Arcot.	Kistna.	
Salem.	Kurnool.	
Tanjore.	Bellary.	
Trichinopoly.	Anantapur.	
Madura.	Cuddapah.	
Ganjám.	Coimbatore.	
Vizagapatam.	Malabar.	
Gódávari.		

(1) *Cotton Spinning and Weaving* (*thirteen districts*).

Ganjám.	Chingleput.	Tanjore.
Vizagapatam.	South Arcot.	Trichinopoly.
Gódávari.	North Arcot.	Madura.
Cuddapah.	Salem.	Coimbatore.
Nellore.		

(2) *Printed Cottons* (*eight districts*).

Kistna.	Coimbatore.	Tanjore.
North Arcot.	Kurnool.	Trichinopoly.
Salem.	Anantapur.	

(3) *Painted Cloths* (*seven districts*).

Tanjore.	Cuddapah.	Coimbatore.
Trichinopoly.	Bellary.	
Madura.	Anantapur.	

(4) *Silk Weaving* (*six districts*).

Ganjám.	Bellary.	Anantapur.
Kistna.	Kurnool.	Coimbatore.

(5) *Carpet Wearing* (*seven districts*).

North Arcot.	Kistna.	Coimbatore.
Tanjore. [illegible]	Bellary.	
Gódávari.	Kurnool.	

(6) *Mat-making* (*eight districts*).

North Arcot.	Ganjám.	South Arcot.
Salem.	Vizagapatam.	Malabar.
Tanjore.	Kistna.	

(7) *Metal Work* (*Brass, Copper, Bronze, Iron*) (*eleven districts*).

North Arcot.	Madura.	Chingleput.
Salem.	Ganjám.	Coimbatore.
Tanjore.	Vizagapatam.	Malabar.
Trichinopol.	Kistna.	

(8) *Ivory and Horn Work* (*two dstricts*).

Trichinopoly.	Vizagapatam.

(9) *Lacquer Work* (*fourdistricts*).

Vizagapatam.	Kistna.
Gódávari.	Kurnool.

Ornamental Fitting (*one district*).

North Arcot.

3. *Cotton Spinning and Weaving.*—Cotton spinning and weaving are the most widespread and extensively followed of the industries of this Presidency, being carried on as important industries in not fewer than thirteen districts, excluding Madras and South Canara. From Mr. Havell's reports it will be seen that the cotton manufacturing industry is almost everywhere on the decline owing to more causes than one. The cheapness of European-made cloths, the growth of spinning and weaving mills in this country, all working with the most recent-improved machinery, the changes which the natives have gradually been adopting in their dress, and the increased cost of living among the weavers themselves, have slowly but surely affected the indusries prejudicially. The question arises—in how many of these thirteen districts has any attempt been made by means of technical or industrial schools to improve the cotton weaving industry? In the town of Vizagapatam there was on 31st March 1895 a small weaving class with two pupils, but it has since been closed. In North Arcot there is a cotton weaving class in the Industrial school, Arni, belonging to the American Mission. In Tinnevelly the industry is taught at Nazareth, under the auspices of the S.P.G. Mission, and at Karúr, in the Coimbatore district, by the Wesleyan Mission. Cotton weaving is taught in the Reformatory school, Chingleput, but in this case it can hardly be regarded as a *local* industry. Cotton weaving is not mentioned by Mr. Havell as an important indigenous industry in the Malabar and South Canara districts; but hand-loom weaving is carried on on commercial lines in both these districts by the Basel German Mission, giving training and employment to over 400 men and an equal number of women. It appears, therefore, that, excluding the Reformatory school, everything that is being done in the way of systematic school or workshop training in hand-loom cotton weaving is being done by Missionaries.

It further appears that in ten of the districts in which this industry is largely followed, there does not exist a single school or class for the purpose of training up the young to become skilled workmen, of improving the machinery, and the methods of production, or of turning out a better quality or style of goods. In these ten districts the industry is left to the traditional methods which the weaver castes have followed from time immemorial. Even in the three districts—North Arcot, Tinnevelly and Coimbatore—in which the industry is taught in Mission schools and where an attempt is made to improve the workman, the machinery, the methods, and the product, the influence on the industry as a whole cannot be great. The pupils in these schools are mostly Christians (and not of the weaver castes), and, even if their number was very much larger than it is, they would fail to produce any marked change for the better among the weaving classes as a whole. Another point to be noted is that the main-end Missionaries have in view in opening and carrying on an industrial school is not so much the improvement of the industry, as the training of the youth of their Native Christian followers, who are mostly poor and must trust to the labour of their hands, to earn a living. The Basel German Mission when it first came to India was a purely evangelizing body. But it soon beame apparent that something must be done for the converts, who, owing to change of religion, were practically debarred from pursuing the avocations they had followed before conversion. Hence the starting of the industrial branch of the mission, which, begun merely as a means of providing a livelihood for the converts, has now attained the vast proportions of a large industrial undertaking giving employment, taking all the industries of the mission into account, to probably between one and two thousand people, and exercising a most valuable indirect influence for good on the industrial development of Southern India. Witness the improvements effected in the quality of country-made cotton goods, which are traceable to the example of the Basel Mission.

And this leads to the question, whether it is expedient to open a number of technical or industrial schools for teaching cotton spinning and weaving in the centres where the indigenous industry still exists, or until recently existed. If such schools were opened and worked on the lines of genuine technical training, and not on those of poor or charity schools, would they have the effect of putting new life into the industry where it languishes, and of improving the skill of the workmen and the quality and artistic finish of the cloth, at the same time diminishing the cost of the goods? The sketch which Mr. Havell gives of the steps by which the industry has declined in the districts visited by him suggests the answer to the above question.

Of the two kinds of cloth usually woven, Mr. Havell shows that the inferior kind, which is that generally used for every-day wear, had been almost entirely superseded, as far as men's apparel is concerned, by cloth of European manufacture, which is very much cheaper. The same is true, though to a less extent, of the cloths worn by women. He points out that European firms had been making every effort to meet the taste of men and women in the pattern of their cloths and that cloths of European manufacture had been introduced into the Indian market exactly similar in outward appearance to the common country bordered white cloth, and selling at two-thirds the price or less. And he draws the conclusion that in a very short time the whole of the native industry in the low class purely cotton cloths must give way. This conclusion is made all the more certain now, when one takes into account the competition of the many cotton spinning and weaving mills established in India and in which all the most recent improvements in machinery and processes are taken advantage of. With regard to the finer class of goods—superior cloths of fine texture in which the borders are broader and of silk and generally embroidered with a simple pattern, the bands at each end being either of silk or of silver lace—Mr. Havell points out that this industry has been affected to a less extent by the competition of European goods; and that it is still able to a certain extent to hold its own against the latter.

From the above the inference may, I think, be drawn that little good would result from the opening of schools for training in the manufacture of the ordinary or coarser kinds of cotton cloth. The traditional methods and appliances of the weaving castes are doubtless susceptible of improvement, and the rising generation would certainly learn something in a school in which as, in the Reformatory School at Chingleput and in the

mission weaving schools, it is shown not only how the native loom can be improved upon, but also how much better results can be produced by modern hand-looms. But the question is, would the influence of such teaching be strong enough to arrest that decadence of the industry on which Mr. Havell dwells, to restore it to its former state of prosperity, and to enable it to hold its own against the competition of European goods and the goods manufactured in the large power-loom mills at work in this country. I have no hesitation in answering in the negative. We know how ineffectual were the attempts made in Great Britain in the earlier part of this century to prop up the hand-loom weaving industry against the invasion of power-loom weaving. It would be equally futile for Government or any other body, however influential, to try to enable the indigenous weaving industry, as far as it concerns ordinary cotton goods, to withstand the irresistible inroads of the machine-made goods of Europe and India. It is a hopeless task, and the sooner its hopelessness is recognized by all parties, the better will it be for the material well-being of this country. It is admitted that the native looms can be improved upon, that more economical processes can be introduced, and that as a consequence a better class of goods for ordinary wear can be produced. But if, with all the improvements in looms, in processes, and in quality of goods, the imported European article and the Indian mill-made article can be put in the market at one-half or two-thirds the price of the native hand-loom article and, therefore, can command a readier sale, no good can result from the attempts by means of technical or industrial training to improve the indigenous industry. Instead of bolstering up a village industry which is doomed to give way to the march of modern machinery, it is far better to turn the energies of the people into channels in which it may not have to contend against such invincible opposition. It has also to be borne in mind that if many members of the community have been thrown out of their customary employment by the introduction of machine-made goods, it is also true that the opening of so many spinning and weaving mills throughout India has given employment to thousands of people. The change that has taken place is not solely a throwing of numbers of people out of employment; it is also the shifting of the industrial activity of the labouring classes to other spheres.

It is somewhat different with regard to the finer class of goods, whether of silk or partly of silk and partly of cotton, which, according to Mr. Havell, is still in demand by the better-to-do classes of the male population, especially on occasions of ceremony, and which continues to be worn by the women if they can at all afford it. The time will assuredly come when machine-made cloth will be able to compare favourably in style, durability and price with even the finer products of the native hand-looms; but at the dates of Mr. Havell's reports the manufacture of these cloths was carried on extensively in Madura and Salem and to some extent, though of inferior quality, in Coimbatore, in the Ceded districts, especially in Bellary, and in the Ganjám, Vizagapatam and Gódávari districts. Writing of the finer manufactures in the Northern Circars made of what is called "silk-weaver's cotton" Mr. Havell says. "This industry is especially noteworthy as showing the direction in which the native handicraftsmen may find a field in which they have nothing to fear from European manufactures." This suggests the principle on which it seems to me we should proceed if spinning and weaving schools are to be started for the improvement of the industry. While, as I have already said, it would be useless to open spinning and weaving schools to improve the manufacture of the ordinary kinds of cotton cloth, seeing that no improvement that such a school could effect would enable the hand-loom goods to complete with power-loom goods, much benefit might result for a time at least from the opening of schools or classes with a view to effect improvement in the manufacture of those kinds of goods (cotton, or silk, or a mixture of both) which have a marked individuality and which have therefore little to fear at present from the competition of imported or Indian mill-made goods. Schools might be opened at selected centres such as Madura and Salem in the south, at one or two centres in the Ceded districts, and at, say, Chicacole in the Northern Circars. The Basel Mission weaving establishments have attained and do retain their present high position, not by weaving goods of the same class as the ordinary productions of European and Indian mills, but by manufacturing goods which in style and durability have a character of their own. Similarly with regard to any schools that may be opened. They must aim at the production of a class of goods and a style of workmanship different from the cheaper products of the native hand-looms or of the power-loom mills.

4. *Printed Cottons and painted cloths.*—Printed cottons are manufactured in eight districts and painted cloths in seven. They are intended chiefly for the use of native women of the poorer and wealthier classes, respectively. Native women have shown themselves to be more conservative than men in the matter of clothing; and these two industries are therefore likely to hold their own for sometime to come.

In former days, Masulipatam was famous for printed cloths and chintzes, and, although the industry has dwindled to a mere shadow of its former greatness, there is still a considerable business carried on. The general outlines of the pattern are usually printed by means of wooden blocks, and the details and, in many cases, almost the whole of the pattern are filled in or painted by hand. The *modus operandi* is to cover the whole of the cloth with wax, leaving exposed only the surface which is to be coloured. The wax is applied hot with a sort of brush. When the wax has dried the required colour is painted on the exposed parts by means of a broad pen or brush. After the paint has thoroughly dried, the cloth is dipped and re-dipped in a hot bath until the wax has all been removed. The cloth is again dried and is again subjected to the waxing process, other parts of the surface being left exposed for the purpose of a second colour being painted in the same way as before. This process of waxing, drying, painting, drying, washing of the wax, and drying, has to be repeated for every colour that has to be painted on the cloth. If it is chintz for Bombay and the Persian Gulf, that is, being made, it has finally to be starched and ironed. The processes are filthy, slow, and expensive, and the patterns far from accurate as regards shape and proportions, though the general effect of the grouping of colours is sometimes very striking. Mr. Pinhey, the then District Judge, who accompanied me in February last to the shops in Masulipatam where these goods are manufactured, agreed with me that the industry as at present carried on was not of a kind that needed the help of a school. The processes are so clumsy, slow and expensive that the industry cannot continue to hold its own against the Western methods of producing printed goods. For years to come there will always be people who fancy the Masulipatam printed cloths and the demand will keep the industry going, albeit in a probably yearly diminishing extent. But the only way in which technical instruction could help those engaged in this industry to any appreciable extent would be to substitute for the present processes some of the simple processes followed in Europe. This would practically mean the creation of an entirely new industry.

5. *Carpet Weaving.*—Carpet weaving is carried on more or less in seven districts, the chief seats of the industry being, however, Ellore, Masulipatam and Ayyampet in the Tanjore district. The industry has sadly declined as regards the extent to which it is carried on and, some think, in the style and finish of the manufactured articles. On my recent visit to Masulipatam I found that the industry had in recent years shrunk in extent and deteriorated in the quality of the carpets. I visited several of the principal carpet weaving establishments, but in none of them did I see anything which could be favourably compared with the high class carpets and rugs of Ellore. This may have been due, not to a falling off in skill on the part of the weavers, but to the fact that no high class carpet had been ordered about the time of my visit. At Ellore the industry has dwindled into comparative insignificance. There are now only sixteen important weaving establishments and carpets and rugs are almost entirely made only to order. The industry is carried on almost entirely by Muhammadans who, like this community in most other places, are very poor. They have no capital wherewith to purchase the materials, or to maintain themselves during the time the carpet is being made. Consequently when a carpet is ordered an advance must be given. Some Madras firms, such as Messrs. Arbuthnot & Co., have an agent at Ellore who advances the money required by the carpet weavers and superintends generally the execution of the work. The carpets ordered by these firms are mostly intended for the European market. The approximate value of the carpets manufactured annually at Ellore is Rs. 10,000. Mr. Havell held the Ellore and Masulipatam carpets in high estimation. In his report on the arts and manufactures of the Northern districts he says, writing of the carpets of the two towns just mentioned: "Carpets of the superior class prepared only on special order are equal in point of finish and material, and infinitely superior artistically, to the imitations of them made in the various jails of the Presidency. There may be a falling off in treatment of

colour and in the execution of the details of patterns compared with the finesse in the working of Indian carpets made 20 or 30 years ago, but the blame for this can hardly be attributed to the weavers themselves and the mischief is not so serious, but that a judicious encouragement of the weavers would soon remedy it. The best patterns in use are not inferior to those of old South Indian carpets which are held up to the disparagement of modern productions.

"The outcry against the deterioration of Indian carpets as far as Madras carpets are concerned is in my opinion not altogether called for. * * * I have seen carpets from the native looms at the three seats of the industry—Ellore, Masulipatam and Ayyampet (Tanjore)—which are in no respect inferior to old specimens in the hands of connoisseurs in London or in native houses and palaces."

It is a great pity that an industry so highly spoken of should be allowed to decline until it threatens to become extinct. The excellence of the colouring is no doubt due to the fact, regarding which I made enquiries when I visited the carpet weavers at Ellore, that only native dyes are used. There are ten principal colours used—white, green, orange, rose, red, black, sky-blue, burnt umber, ivory white and khaki bangaram. The patterns I was informed were brought by Cabul merchants may years ago. These old patterns are strictly adhered to, unless customers wish it otherwise ; but any sample pattern can be imitated. The preparation of the dyes and the dyeing of the wool are done by the women of the family, the weaving being done by the men and boys. The weaving is carried on in sheds which are generally somewhat deficient in light and ventilation. The poverty of the carpet weavers is the chfef obstacle in the way of improvement and in addition to that there are, as Mr. Havell says, "the unbusinesslike habits of ordinary native workmen." A steadily growing demand for the best productions of the looms would tend to ameliorate the economic condition of the weavers and, by alleviating the extreme pressure of dire necessity, might in course of time permit of the growth of a keener artistic sense, a greater pride in their work, and a determination to maintain a high standard of excellence in material, design and finish. At present the poverty of the workers tends to keep ever prominently before them the immediate money return which they look to for their labours : a condition most unfavourable to excellence of workmanship.

In the report of the Committee appointed in G.O., No. 471, Educational, dated 7th June 1895, to enquire into the working of the School of Arts, information is given as to the steps taken towards the teaching of carpet weaving in that school and the comparative failure of this part of the work of the school, owing to the difficulty experienced by the pupils in getting employment in after life. The boys who have taken up this industry in the school have done so, not from any liking for it, nor on account of carpet weaving being the hereditary occupation of their family. Consequently on leaving the school they had no special inducements to continue the occupation. I do not see my way to recommend the opening of a carpet weaving class in Ellore, and at present the subject is not taught at the Industrial School at Bezwada. But if carpet weaving is to continue in the School of Arts, two or three scholarships might be offered every year two boys belonging to the carpet weaving families in Ellore, Masulipatam and Ayyampet to enable them to join the School of Arts. On completion of their school course they would mostly return to their homes carrying with them wider and more accurate knowledge and, if not a higher manipulative skill, a more intelligent appreciation of the technique of carpet weaving. Of course these trained young men would still be confronted by the existing fundamental difficulty—want of funds—a difficulty which the Educational Department can do little of a direct kind to remove.

6. *Dyeing.*—Connected with the textile industries is dyeing. This matter was fully entered into in the report of the committee on the School of Arts which sat in 1895. The report is now before Government.

7. *Mat-making.*—This industry is carried on to a considerable extent in eight districts. The best mats are made at Palghat in Malabar and at Pattamadai in Tinnevelly. The industry is of a simple nature, followed mostly by women and children, and no special schools need be established to teach it.

8. *Metal-work.*—Working in metals (iron, brass, copper, bronze, silver and gold) is, as one might expect, a very widespread group of industries. Most of the articles

turned out are intended for use in native households or for house or personal adornment; and the industries have not suffered, and are not likely to suffer, from competition so soon or to so great an extent as in the case of cotton goods. Of the eleven districts mentioned by Mr. Havell in which one or more of the metals are worked to a considerable extent, only six have schools or classes in which metal work is taught, namely, Vizagapatam, Kistna, Chingleput, North Arcot, Madura and, more recently, Tinnevelly. In the town of Vizagapatam, St. Aloysius' school has an excellent school under European management for the training of European and Eurasian boys in carpentry and blacksmith's work, including fitter's work. The Industrial school at Vizianagram is more a manufactory than a school; the work being mostly done by ordinary tradesmen, hardly any attempt being made to train up young people. The Industrial school under the management of the Kistna District Board has, since its transfer from Masulipatam to Bezwada, been making good progress and bids fair to become a most useful institution. Hitherto it has worked only in wood and iron, but Mr. Atkinson proposes to introduce brass and copper work. In the Protestant Orphanage, Bellary, a few European or Eurasian youths are taught elementary blacksmithing. Omitting the town of Madras, there is in the Chingleput district the Reformatory school, which, as I said before, can hardly be called a school for training in local industries. The American Mission school at Arni teaches blacksmith's work to youths belonging to the Mission. The Madura Technical Institute, under the management of the District Board, teaches blacksmith's and fitter's work and work in brass, copper, &c. Recently the Tinnevelly District Board has opened an industrial side in the Board Training school, in which blacksmith's work is taught. This school and the Madura school are practically the only institutions outside Madras which are open to all classes of the community. The Nazareth school, a pioneer in industrial teaching, is open to Native Christians exclusively or almost so. Every opportunity will be taken by the department to encourage and assist in the opening of classes for instruction in metal work in all the great centres of this important industry.

I have recently had standards in metal work (brass, copper, silver, &c., prepared to correspond with standards A to D in other industries as laid down in Chapter V of the Educational Rules. Syllabuses have also been drawn up for Elementary, Intermediate and Advanced examinations in the subject. These will shortly be submitted to Government for approval. The demand for this class of metal work amongst natives is considerable, and as I have said it has less to fear from foreign competition than some of the other industries. Much can be done by proper training to improve the workmanship and style of the ordinary household brass and copper utensils. As met with in the bazaar they are often coarse in execution and crude in ornamentation, and there is thus ample scope for educating the taste of the people. Mr. Chatterton is of opinion that aluminium might be used with great advantage for many of the domestic utensils now made of copper, not the least of its recommendations being its lightness. He is making enquiries into this matter during his stay in England on furlough.

9. *Wood Work.*—Closely connected with metal work is wood work; but there does not appear to be the same local character to this industry. The carpentry and cabinet-making of one locality are very like those of other localities; and whereas we find certain towns possessing a distinctively characteristic class of metal goods (whether copper and brass, or the more expensive silver and gold) there is little or nothing distinctive in the construction of the wooden articles of daily use whether as household furniture or implements of manual labour. It is only in the higher classes of wood work such as wood-carving that one sees the distinctive characteristics of different localities.

In all the industrial schools in which working in iron is taught wood work is also taught. But for the most part the instruction is confined to plain carpentry and cabinet-making and it is only in one or two of the long established schools that the higher branches are taught or that any attempt is made to teach wood-carving. In the School of Arts care is taken that the best styles of wood-carving are followed, the instructors being specially selected for the purpose.

10. *Leather work.*—Leather work has been dealt with by the committee on the School of Arts and need not be further dwelt upon here.

11. I have now touched upon the leading industries pursued in this Presidency outside the town of Madras; but I have said nothing of agriculture, as I understand that that important subject lies outside the scope of this reference. Similarly with regard to the very important industry on which so many thousands of the coast population depend, namely, fishing. In dealing with the several textile industries and with metal work and wood work I have incidentally alluded to some of the means that might be adopted to improve them. It remains for me to make a few observations of a general nature.

12. An obvious remark to make is that such industrial or technical schools as exist should be made as efficient as they possibly can be made. Year by year these schools are improving, but they are sadly hampered by want of money and of qualified instructors. Want of money is a serious hindrance in the case of these schools carried on mainly with the charitable object of helping the children of the poor to earn a living. But all are suffering from the want of qualified instructors. In order to start these schools at all, managers were compelled for the most part to employ the ordinary bazaar artizan who, however skilful in rule of thumb operations, had very hazy motions how to teach, much more how to explain the reason for doing some thing in one way rather than in another. This difficulty of teachers is slowly being overcome. Besides the young men trained in the up-country industrial schools, the School of Arts is year by year sending out youths able to teach cabinet-making and decorate wood work, as well as working in copper, brass, silver and gold. With a sound knowledge of and skill in drawing as applicable to these several industries, these young men cannot fail to improve the instruction in the schools in which they teach. I am also very sanguine as to the benefit that will accrue to industrial and technical schools from the proposal recently sanctioned by Government to train a few young men as teachers in the workshops of the College of Engineering. These young men will be put through carefully-devised systematic courses in wood-work and metal-work (excluding gold and silver) and they will be trained to master every operation, not only as regards the manual dexterity involved in it, but also in its theoretical bearings.

13. Besides the raising of the efficiency of existing schools, the opening of new schools in suitable localities is an urgent necessity. There ought to be one school in every district in which the more important of the industries of the district would be dealt with and which would be open to all classes of the community. In Vizagapatam, Kistna, Bellary, Chingleput, North Arcot, Trichinopoly, Madura, Tinnevelly, Coimbatore and Nilgiris, a beginning has been made. But in most of these districts the schools are open only to one section of the community, as, for example, to Europeans and Eurasians in Bellary, Chingleput and the Nilgiris, or to Native Christians in North Arcot and Coimbatore. In several cases the schools are fundamentally eleemosynary schools, in which the improvement of the industries and the industrial training of the pupils are hampered by, if not subordinated to, the charitable ends of the institutions. In only three districts have schools been opened by local boards, namely, in Madura, Tinnevelly and Kistna. The Kistna board school is at Bezwada and is a promising institution. I have addressed the Presidents of the local boards and the chairman of municipalities in the Gódávari district, pointing out the expediency of their contributing to the support of the Bezwada school until such time as they are in a financial position to start an industrial and technical school of their own. Similarly, as a beginning, a school might be opened at Vizagapatam or Vizianagram to serve the two northernmost districts of the Presidency. As for the Ceded districts, they must have at last one school. I have addressed the Presidents of the district boards and the chairman of the municipal councils on the subject and I hope that a school will be opened as soon as the present distress is over. More than one school cannot, I think, be attempted for the present. There should be one school for North and South Arcot in addition to the existing mission school at Arni, which is intended for Christians. It has long been under consideration to open an industrial and technical schools for the Tanjore district at Kumbakónam, and it was at one time intended that the funds collected in commemoration of Her Majesty's Jubilee should

be devoted to this purpose. A drawing class has been carried on for many years and this class would form the nucleus of the proposed school. Kumbakóna m is an important centre for metal work and a technical school might do much to develop the industry. The districts of Trichinopoly, Madura and Tinnevelly have each got good industrial and technical schools and all that is needed is development, especially in connection with the industries that are carried on in the respective districts. A small industrial school has recently been opened in Salem by the London Mission, and beyond this nothing has been done. This district ought to maintain a school for metal work at least. In Coimbatore there is only the Karur school, carried on by the Wesleyan Mission, and intended chiefly for native Christians of the poorer classes. If this school were liberally supported by public funds, it might become a school for all classes throughout the district. I do not think any industrial school can be started in the Nilgiri district at present. Malabar and South Canara have each the advantage of the great object lesson presented by the Basel Mission Industrial establishments.

14. Besides schools in every district or group of districts, it is very important that these schools should get the benefit of the best scientific supervision that Government is able to provide. Hitherto the mufassil schools have had little guidance or assistance from the central institutions in Madras. I have for some time been trying to systematize the work done in these up-country schools so as to cover as much as possible of the industrial field, while endeavouring to prevent waste of power by a plurality of schools in the same neighbourhood teaching, and often teaching badly, the same subjects. This concentration of effort on the part of each school is further necessary if the schools are to be properly inspected. Schools teaching civil and mechanical engineering subjects will be brought into relation with the College of Engineering and will be regularly inspected by the Professor of Engineering or some other member of the College staff. At present only two schools undertake to teach Electrical Engineering. These will be inspected by the Professor of Physics of the Presidency College. Either the same Professor or the Professor of Chemistry will inspect the few schools in which physical science or geology is attempted. If any schools take up the biological science they will be inspected by the Professor of Biology, Presidency College. There is only one school which attempts to teach agriculture theoretically and practically, and that will be inspected and reported on by the Principal of the College of Agriculture or some other member of the staff of that institution. I propose to put all commercial schools and classes under the inspection of the Headmaster of the School of Commerce, Calicut. Schools for drawing, jewellers work, wood work and metal work, textile industries and pottery will be inspected chiefly by the Superintendent or Assistant Superintendent of the School of Arts or in some cases by a member of the staff of the College of Engineering, according as the subjects are akin to those taught in the School of Arts or to those taught in the College of Engineering. Schools for the several branches connected with printing will continue to get the advice of the Superintendent of the Government Press or the Deputy Superintendent, who, though probably they could not themselves inspect the schools, might be able to depute some one to do so. Speaking generally, it may be said that when an officer of Government is not available, a non-official expert will be specially appointed to inspect and report.

What I am aiming at is practically the affiliation of the up-country schools and clases to the large and well-equipped central Government institutions in Madras, and in the case of commercial schools and classes to the Government School of Commerce, which at present is located at Calicut. This is the policy followed in Bengal with all schools teaching subjects embraced under or allied with Engineering. It has been followed more or less for some years in this Presidency, but not systematically. In paragraph 3 (3) of G.O., No. 813, Educational, dated 25th October 1894, Government alludes to two difficulties attending the inspection of technical institutions: (1) the want of funds and (2) the number of such schools being two small to give full work to an inspector. There is an additional difficulty, namely, that no one man can be found who is sufficiently familiar with all the subjects of technical and industrial education. The scheme of inspection outlined above will cost little more than the travelling allowances of the officers concerned and, owing to the small number of

schools, its interference with the ordinary work of the officers concerned will be for years to come inappreciable. It is the only way in the present circumstances by which these up-country schools can enjoy the benefit of the highest knowledge and skill which Government has at its disposal.

15. But improved knowledge and skill acquired in schools, resulting in improvement in the productive power of the industrial classes, will be of little avail unless accompanied by a greater demand for the products of industry and art. The decline in the demand for locally-made cotton cloths has brought about a decrease in their quantity and quality. What steps should be taken to increase the demand for local manufactures, is a difficult problem and one which hardly comes within the province of the Educational department. Government cannot undertake to provide a market for the products of the several industries, though it may assist in doing so. Government has often directed the heads of departments to purchase certain country-made articles in all cases where they are cheaper than, and not inferior to, the European articles. This policy of using locally-made goods in preference to indenting on England through the India Office should receive a far more extended application than it has hitherto done. It is idle to talk of developing local industries as long as Government, one of the largest consumers of the products of industry, send to Europe for so many articles which could be manufactured in the country and which would be manufactured in the country in larger quantities, if only the employers of labour were sure of Government patronage. The people themselves can do much to encourage local industries and to improve them. Lord Wenlock on one occasion remarked that, unless natives of means are prepared to surround themselves with articles of use or ornamentation of a higher class than the ordinary bazaar goods, it was of little avail for schools to be opened to train artisans to produce a higher class of goods—a class of goods for which there is no effective demand. District associations might be formed by the people themselves for the purpose of taking an earnest interest in, and exercising a watchful oversight over, the development of local industries by creating and fostering a desire for local manufactures. If there should thus arise a demand for local manufactures, there need be little fear but that the industrial classes will soon adapt themselves to the requirements of the local and foreign markets. A state system of technical education will increase a demand already existing, but to expect it to create a demand is chimerical. Some people speak as if the State must do every thing; but it appears to me that the industrial and commercial classes and the community at large have an equally important duty to perform. The circumstances of India are not so different from those of Great Britain as to render inapplicable to this country the following words of Sir Courtenay Boyle in a memorandum recently compiled by him and presented to Parliament:—

"The commerical position of the United Kingdom has been attained and must be kept up in the future by the untiring zeal and energy of the industrial community. The work of seeking out customers, providing commodities that customers will buy, exploiting new markets and elaborating new methods, rests with individual. The State can only afford encouragement and help, especially in the way of supplying accurate and carefully collected information."

16. The enclosed appendix shows at a glance the chief local industries in each district, the special schools or classes in which instruction is given in technical, industrial or art subjects with the subject taught in each school and the classes of the community chiefly attending such schools. This statement will in future be kept corrected to date and will be inserted as an appendix to the annual report.

ENCLOSURE.

Districts.	Chief local industries.	Industrial or Technical schools.	Industries taught in these schools.	Classes of community attending these schools.
Ganjám ..	Cotton spinning and weaving. Silk weaving. Mat making. Metal work.	....	....	....
Vizagapatam	Cotton spinning and weaving. Mat making. Metal work. Ivory and horn work. Lacquer work.	London Mission High School, Vizagapatam.	Engineering, earth work, surveying and levelling, mensuration.	Brahmans 8, non-Brahmans 4.
		Imperial Arts Institute, Vizagapatam.	Carpentry, printing weaving.	Muhammadans.
		St. Aloysius Institute, Vizagapatam.	Carpentry, fitter's work, blacksmith's work.	Europeans and Eurasians 6, Native Christian 1.
		Industrial School, Vizianagram.	Carpentry, metal work, rattan work, embroidery, pottery ivory work.	
		Municipal Drawing Class, Vizagapatam.	Drawing	Native Christian 1 Muhammadans 6, Brahmans 6, non-Brahmans 11.
Gódávari ..	Cotton Spinning and weaving. Carpet weaving. Lacquer work.	Tallapudi Industrial School for Women.	Lace-making, hand-knitting.	Native Christians 19 non-Brahmans 2, Panchamas 2.
Kistna ..	Printed cottons. Silk weaving. Carpet weaving. Mat making. Metal work. Lacquer work.	Board Industrial School, Bezwada.	Carpentry, blacksmith's work, drawing.	All classes (Native Christians 8, non-Brahmans 4 Panchamas 7).
		Guntúr ..strial School for Muhammadan Women.	Embroidery	Muhammadan Women 17, Native Christians 4.
Kurnool ..	[Cotton weaving]. Printed cottons. Silk weaving. Carpet weaving. Lacquer work. [Metal work]. [Dyeing].	....	....	....
Bellary ..	Painted cloths.	Wardlaw College ..	Shorthand	Muhammadans 2, Brahmans 6.
	Silk weaving.	Protestant Orphanage..	Carpentry, blacksmith's work, printing, boot and shoe-making.	Europeans and Eurasians.
	Carpet weaving.			
Anantapur..	Printed cottons. Painted cloths. Silk weaving.	....	....	....
Cuddapah ..	Cotton Spinning and weaving. Painted cloths.	....	....	....
Nellore ..	Cotton spinning and weaving. [Metal work]. [Dyeing]. [Mat making].	....	....	....
Madras ..	Cotton spinning and weaving. Painted cloths. Mat making. Metal work.	School of Arts, Madras.	Drawing, wood-engraving, jeweller's work, cabinet-making, carpet-weaving, pottery, lacquer work.	Europeans 64, Native Christians 59, Muhammadans 22, Brahmans 14, Non-Brahmans 458, Panchama 1.
		Madras Industrial School.	Carpentry, blacksmith's work, boot and shoe making.	Eurasian 21. Brahman 21, non-Brahmans 59.
		Chengalvaraya Nayakar's Commercial School.	Surveying and levelling, mensuration, book-keeping, commercial correspondence, banking, shorthand, typewriting.	
		Anjumnai Mufidi Al Islam.	Carpentry, wood-turning drawing, blacksmith's work, embroidery.	Muhammadans 172.

Districts.	Chief local industries.	Industrial or Technical schools.	Industries taught in these schools.	Classes of community attending these schools.
Madas—*cont.*		School of usic ..	Music..	Eurasians 114.
		Black Town Presentation Convent Special Class.	Music, singing, drawing ..	Eurasians 311, Native Christians 16, Brahman 1.
		Vepery Presentation Convent Special Classes.	Music, drawing	Eurasians 39.
		College of Engineering.	Civil and mechanical engineering.	Europeans 2, Native Christians 2, Muhammadans 4, Brahmans 74, non-Brahmans 63.
		Youngmen's Christian Association Classes.	Book-keeping, commercial correspondence, banking, shorthand.	Europeans 5, Native Christians 4, Muhammadan 1. Brahmans 16, non-Brahmans 33.
		Government Press, Technical Class.	Printing	Europeans 12, Native Christians 10, Muhammadans 2, Brahmans 13, non-Brahmans 124, Panchamas 7.
		Chengalvaraya Nayakar's Orphanage.	Drawing, printing	Non-Brahmins 52.
		Civil Orphan Asylum..	White embroidery, hand-knitting.	Europeans 9.
Chingleput .	Cotton spinning and weaving. Metal work. [Paper making]. [Dyeing].	St. Patrick's Orphanage, Adyar.	Mensuration, carpentyr, book-keeping, boot and shoe making, tailoring.	Europeans and Eurasians 92.
		Reformatory School ..	Carpentry and cabinet-making, blacksmith's work, drawing, cotton-weaving, tailoring, wood-engraving, type-making.	Native Christians Muhammadans 24, Brahmans 4, non-Brahmans 82, Panchamas 21, and others 14.
		Hindu Branch Training School, Saidapet.	Drawing	Native Christians 26, Brahmans 154 non-Brahmans 14 and Paraiyas.
		Teacher's College ..	Agriculture, drawing ..	Native Christians 5, Muhammadan 1 Brahmans 54, non-Brahmans 4.
North Arcot.	Cotton spinning and weaving. Printed cottons Carpet weaving .. Mat making. Metal work. Ornamental fitting.	American Mission Industrial School, Arni.	Carpentry, blacksmith's work, printing, cotton weaving, tailoring.	Native Christians 62, non-Brahman 1, Panchama 1.
		H.L.G., Mission School, Tirupati.	Mensuration, book-keeping, commercial correspondence.	Native Christian 1; Brahmans 13, non-Brahmans 3.
South Arcot.	Cotton spinning and weaving. Mat making.	....	....	....
Tanjore ..	Cotton spinning and weaving. Painted cottons. Painted cloths. Carpet weaving. Mat making. Metal work. [Silk weaving.] [Silk dyeing.] [Pith goods.]	Kumbakonam College, Drawing Class.	Drawing	Brahmans 21, non-Brahmans 29.
		Chakrapani Sannadhi, A.V. Middle School.	Drawing	Brahmans 155, non-Brahmans 19.
Trichinopoly.	Cotton spinning and weaving. Printed cottons .. Painted cloths .. .. Metal work .. .. Ivory and horn work.	Municipal Drawing Class, Srirangam.	Drawing	Brahmans 12, non-Brahmans 3.
		S.P.G. Boys' Industrial School, Puttûr.	Carpentry, tailoring ..	Native Christians 14, non-Brahmans 10.
		S.P.G. Girls' Industrial School, Puttûr.	Lace making	Native Christians 22.
		Albert Victor Technical Institute.	Mensuration, telegraphy, book-keeping, commercial correspondence, shorthand, drawing, printing, engineering (civil and mechanical).	European 1, Native Christians 10, Muhammadans 6, Brahmans 114, non-Brahmans 50.
		St. Joseph's College, Trichinopoly.	Mensuration, telegraphy book-keeping, commercial correspondence, shorthand drawing, printing.	Native Christians 27, Brahmans 105, non-Brahmans 51.

Districts.	Chief local industries.	Industrial or Technical Schools.	Industries taught in these schools.	Classes of community attending these schools.
Madura ..	Cotton spinning and weaving. Painted cloths. Metal work.	Board Technical Institute, Madura.	Mensuration, carpentry and cabinet making, blacksmith's and fitters, rattan, work, agriculture, shorthand, drawing, wood engraving.	Europeans 2, Native Christians 20, Muhammadans 36, Brahmans 71, non-Brahmans 72, and Panchamas 19.
		S.P.G. Industrial School, Ramnad.	Printing	Native Christians 22.
Tinnevelly.	[Cotton weaving.] [Mat making.] [Jaggery making.] [Metal work.]	S.P.G. Technical Class, Tuticorin.	Music	Native Christians 11 and Panchama 1.
		S.P.G. Art Industrial School for Boys, Nazareth.	Carpentry, shorthand, drawing, cabinet making, blacksmith's and fitters work, wood engraving, cotton weaving, embroidery, tailoring.	Native Christians 352, Brahmans 12, non Brahmans 21, and Panchamas 3.
		S.P.G. Art Industrial School for Girls, Nazareth.	Lace-making, embroidery.	Native Christians 40.
		Board Industrial School, Tinnevelly.	Carpentry, blacksmith's work.	Natie Christians 4, Muhammadans 9, non-Brahmans 15.
Coimbatore.	Cotton spinning and weaving. Printed cottons. Painted cloths. Silk weaving. Carpet weaving. Metal work. [Leather tanning and leather work.] [Jaggery-making.]	Children's Home, Karur.	Carpentry, music, drawing, blacksmith's work, rattan work, cotton weaving, tape-making.	Native Christians, 58 non-Brahman 1, Panchamas 2.
Salem ..	Cotton spinning and weaving. Printed cottons. Mat making. Metal work.	....	....	....
Nilgiris ..	....	Lawrence Asylum, Ootacamund.	Carpentry, telegraphy, music, drawing, boot and shoe making, tailoring.	Europeans and Eurasians.
Malabar ..	Mat making. Metal work.	School of Commerce, Calicut.	Book-keeping, commercial correspondence, banking, shorthand, typewriting.	Europeans 5, Native Caristians 10, Muhammadans 2, Brahmans 40, non-Brahmans 44.
South Canara.	[Cotton weaving and (ordinary)]. [Metal work (Goldsmiths)]. [Brick and tile making]. [Printing]. [Book-binding]. [Engineering].	....	....	....

[Edl. / 5]
1,000—20-4-98.

Educational (1898) Department.

CURRENT No. 1669

From The Financial Dept.

Order

No. 1252.

Dated 20 Dec 98

Received

Registered

Enclosures

Spare copies.

SECRETARIAT GOVERNMENT
22-DEC-1898
LOCAL & MUNICIPAL DEPARTMENT

SUBJECT.

Sanctioning an additional allotment of Rs. 15000 from Savings under 29 Superannuation allowances and pensions for the maintenance of the Agricultural industry in the Madras School of Art until the end of the current financial year.

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

CURRENT No. 1669

Financial Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Educational (1898) Department.

Read again G.O.No.1006, Financial, dated 4th November 1898.

" " " " 1243, " " " 17th December 1898.

Read also the following paper:-

Endorsement of the Director of Public Instruction, Madras, No.14180, dated 15th December 1898, submitting with remarks letter from Mr. Chatterton applying for an allotment of R.15,000 for the aluminium for the current year.

ORDER:-No. 1252 dated 20th December 1898.

A further allotment of R.15,000 is sanctioned from savings under 29 SUPERANNUATION ALLOWANCES AND PENSIONS.

2. The provision of R.30,000 for the manufacture of aluminium articles made under 22 EDUCATION in G.O.No.1243, Financial, dated 17th December 1898, will be raised to one lakh and the receipts under XIX F EDUCATION - Miscellaneous- "Sales at the School of Arts", as revised in the order quoted, will be correspondingly increased by R.70,000.

(True Extract)

for Chief Secretary.

20/12/98.

To

The Educational Department. ✓

" Director of Public Instruction.

" Accountant-General.

Educational (1899) Department.

CURRENT No. 578

ASSISTT SECY TO GOVT
18 APR 1899
EDUC. MUNL EDU & LEG DEPTT

DESPATCHED
17 APL 1899

From The Director of Public Instruction, Madras.

Order

No. 4437

Dated 17th April 1899.

Received } 18—4—99

Registered

Enclosures

Spare copies

SUBJECT.

Requesting that Mr. Chatterton be appointed as a temporary measure Inspector of Technical & Art schools on a monthly local allowance of Rs 200 with effect from 1st April 1899.

Ref.
Putuptin D.P.I's letter no 5851 dt 1st June 1897:

BACK PAPERS.

G.O.	No.	Department.	Date.
R 104 dy 6.2.99			
192. 2.99			
Ent 1243 dy 7.2.99 Copy			
Ent Inspn Report			

FURTHER PAPERS.

G.O.	No.	Department.	Date.

CURRENT No. 578

OFFICE OF THE DIRECTOR OF PUBLIC INSTRUCTION,

Madras, 17 April 1899

No. 4437

From

G.H.Stuart,M.A.,

THE HONORABLE MR. ~~D. DUNCAN, M.A., D.SC., LL.D.~~,

Ag. DIRECTOR OF PUBLIC INSTRUCTION,

Madras,

To

THE SECRETARY TO GOVERNMENT,

~~Educational~~ DEPARTMENT,

Fort St. George.

SIR,

In paragraph 122 of the last report on Public Instruction Dr.Duncan brought to the notice of Government the necessity for entrusting the inspection of technical, industrial and art schools in the Presidency t[o] [be] [done] already in the Department as an additional duty unt[il] [a] [vacancy] could be found for the appointment of a permanent Inspect[or] [of] technical schools and with the above view he provided [Rs.2400] in the appendix to the budget estimate for the current year Rs.2400 [for] allowance to the Inspector of such schools. In its order No. [dated] financial, dated 12th January 1899, Government was pleased to sanction the items of charges entered in the appendix to the budget estimate; but Dr.Duncan seems to have deferred addressing Government on the subject, pending the orders on the reorganization and the future of the School of Arts (vide G.O.No 1, Educational, dated 2nd January 1899). No orders have yet been passed on the question. In the meantime, some temporary arrangement is necessary for the inspection of technical, industrial and art schools during the current year and I have the honour, accordingly [to request that] Mr.Chatterton, who is best qualified to inspect and examine such schools and who has hitherto [been doing some extra work] without any extra remuneration [whatever] measure, Inspector of Tec[hnical]

PRESIDENCY COLLEGE LITERARY SOCIETY, MADRAS.

TECHNICAL EDUCATION.

A LECTURE DELIVERED BY

MR. ALFRED CHATTERTON, B.Sc., ASSOC. M. INST. C.E., M.I.M.E.,

ON THE

20TH APRIL 1896.

Madras:
PRINTED AT THE LAWRENCE ASYLUM PRESS, MOUNT ROAD.

1896.

TECHNICAL EDUCATION

By Mr. ALFRED CHATTERTON, B.Sc, ASSOC. M. INST. C.E., M.I.M.E.

Mr. Chairman and Gentlemen,

Technical education, the subject, upon which I have been asked to lecture to you this evening, has during the last 15 years become one of the great social problems of England, and to its solution the energies of some of the ablest men of the day have been devoted, and vast sums of money have been expended in carrying into practice the conclusions that have been arrived at after prolonged deliberation and detailed enquiry. For some ten years or more Technical education has agitated the minds of Indian administrators, and in each province of the country efforts have been made to place the facilities for obtaining Technical instruction more or less in line with the local industrial requirements. It is doubtless known to most of you that here in Madras during the last two years there has been carried on a most animated discussion on the subject, and that although as yet no practical results have accrued from it, the air has to some extent been cleared, and Government will be able to take active measures, if such be deemed necessary, after having both sides of the question most fully and openly placed before them. Into this polemical region it is not my purpose to lead you this evening, and I hope rather to be able to place before you such information as will enable you, if you care to pursue the subject further, to do so intelligently and free from pre-conceived erroneous ideas. It was but a few weeks ago that your distinguished countryman, the Hon. Mr. Justice S. Subrahmanya Aiyar, in his address at the Convocation of the University, pointed out to the newly admitted graduates the necessity for some modification in our existing system of education to meet the gradually changing condition of the intellectual labour market. In this connection I cannot help quoting his words: "If those who have received the benefits of liberal education would only take courage and step out of the beaten track of the public service or the usual professions, and enter into other, equally honourable though more laborious, walks of life as yet untrodden by them, I feel sure they will find plenty of good work to do, which would prove not only fairly remunerative to those who do it, but also would, in the long run, be beneficial to the community as a whole." Hitherto the public services,

the legal profession, and in a minor degree the educational institutions of this Presidency, have absorbed and found employment for the great majority of those upon whom the University has set the seal of her approval, but the rapid extension of higher literary education is rendering this distinction of smaller market value, and the time is coming, if indeed it has not already come, when many of you, at the end of your college careers, will find it difficult, if not impossible, to make a respectable livelihood in the paths which you have hitherto considered most lucrative and most adapted to your personal idiosyncrasies. The love of personal ease and hatred of active physical exertion has been and still is the leading characteristic of the intellectual races of this country, and so long as that prevails there will, I fear, be little chance of your obtaining conspicuous success in the other walks of life which are open to you. I am glad, however, to notice that there is in every college I am acquainted with, and in this college particularly, a gradually increasing number of students, who have thrown aside their inherited sedentary habits, and have displayed an amount of enthusiasm for, and degree of skill in, outdoor exercises, which augurs well for their future. The love for an active life is a growing one, and I can only hope that some of you, at any rate, will be sufficiently imbued with it, that it will lead you to eschew those occupations which are pursued at the desk or writing table, or in the courts of justice or the lecture rooms, and to turn your attention to other possible ways of making a living. It is to such among you that my remarks this evening on Technical education will be more particularly addressed.

At the outset it behoves me to try and explain to you what is meant by the term "Technical education," how it came into vogue, how it is being carried on and what it has done for other countries, before I can discuss with you the Indian, and more particularly the Madras, side of the question which is that in which you are personally most concerned. Of course, you will understand that the limits of time preclude me from attempting to give you any thing more than the merest outlines of this subject; but in dealing with it I shall endeavour, as far as possible, to illustrate it by references to my own personal experience. Technical education has received many definitions, and in consequence there is much vagueness as to what is really meant by it, so that it is necessary to first state exactly what limits I intend to assign to it in dealing with the subject this evening. Viewed in its broadest aspect it is education that has for its object not merely the training of the mental faculties, but also the acquirement of knowledge which shall be directly useful in after life. It is however usual to limit the term to education in the arts and sciences which have

a special bearing on the subsequent professional work of the person who receives it. Under this definition as Technical schools would be classed such institutions as the Law and Medical Colleges of Madras, and indeed they are such, since without the preliminary training received in them, or its equivalent, it would be impossible for any of you to hope to succeed in those two great professions to which they lead up. Somewhat illogically perhaps, but in practice it has proved convenient, we exclude such courses of training as are given in these institutions and confine the term "Technical" to instruction in the principles of science and art applicable to industries, and in the application of special branches of science and art to specific industries or employments, as well as in modern languages and commercial and agricultural subjects, but not in teaching the practice of any trade or industry or employment. This is the definition given in the Technical Instruction Act of 1889, and except that I propose to omit all reference to commercial education, it is that which I have adopted for the limits over which my lecture will range. You will see that it particularly excludes industrial schools in which the only object is to train artizans in the practices of their trades. In fact, Technical education, as I want you to understand the term, is not a substitute for the training of the office, the workshop, the factory or the mill, but is supplementary to that which can be obtained in such places, and by no means obviates the necessity for serving some kind of apprenticeship to practical work. Sometimes the theoretical instruction of the Technical school is given as a preliminary training, but more frequently it is carried on in the evenings concurrently with the acquirement of practical knowledge and experience in the daytime.

The necessity for Technical education has only been recognized in England during the last quarter of a century, but on the continent of Europe its begnnings dates back much further, and at a much earlier period it became part of the general educational systems in force. The origin of the modern industrial system lies in the inventions due to the genius of a group of Englishmen, who flourished in the middle and latter half of the eighteenth century, of whom Watt, by perfecting the steam engine, Arkwright, by the invention of the spinning jenny, Hayman, of the mule, and Crompton, of the powerloom, were the chief, and the results of their labours were seen in the rapid growth of the great manufacturing towns of Lancashire and Yorkshire. All throughout the period of the great wars which followed the French revolution, England was able to maintain her soil free from the ravages of the invading armies which overran the rest of Europe, and the great strain of the Napoleonic wars was met by the development of our internal resources. In the years which followed the restoration of peace, whilst

continental nations were slowly recovering from the frightful losses in men and money which they had sustained, England was actively engaged in developing the mechanical arts, and the manufacturing centres were rapidly growing into huge towns full of factories worked by steam, in which raw materials were converted into high class finished goods for the rest of the world. The labours of men like the Stephensons, father and son, Whitworth, Armstrong, Bessimer, and a host of others continually added to the commercial supremacy of Great Britain, so that when European nations, recovering from the lethargic state into which they had been plunged, began to adapt themselves to this new order of things, they found it necessary to call to their assistance the skill and experience then possessed by Englishmen alone, and to English engineers, contractors and workmen were entrusted the inception and carrying out of the railways and first industrial enterprises which were started.

The Great Exhibition of 1851 demonstrated only too decisively the immense superiority in the mechanical arts enjoyed by England, and the necessity for vigorous measures on the part of foreign countries to supply their people with the Technical knowledge and skill they so greatly lacked. Technical schools and colleges were started, in which engineers and men of science, trained in England or with English experience, laboured earnestly to supply the deficiencies of their countrymen. Money was freely spent, every encouragement and facility was given for research, and no effort was spared to render the instruction efficient with the result that the lee-way was rapidly made up, and as time sped on it became apparent that in many branches of industry, particularly in those requiring an intimate acquaintance with organic chemistry, England no longer enjoyed the undisputed supremacy of earlier days. Gradually the idea became prevalent that there was much in continental systems of education which was superior to the old-fashioned methods still in vogue in England, and that it would be necessary to institute sweeping reforms to place ourselves once more in the van of progress. Enquiries followed, and it was found that the ever-growing use of machinery led to the concentration of productive centres and to a sub-division of labour which rendered it impossible for workmen to acquire in the workshops that general knowledge of their trade which is essential, and that though they might acquire great skill in particular operations, yet more was wanted, and it was clearly seen that Technical schools were necessary in which they might obtain that general knowledge of their whole trade and of the scientific principles underlying it, which must be the possession of an intelligent and useful workman. Still more defective was found to be the method of training those who by birth and social position were destined in after life to be the leaders and directors of industrial enterprise. The practical applications of science are so numerous that without a preliminary scientific training, which it is difficult, if not impossible, to acquire amid the noise of machinery and the general bustle of a great factory, success is likely to be obtained only by those few men in whom defects of education are only additional incentives to exertion. In the old days the pupil or apprentice worked with his master and looked after his master's interests, and in return was initiated into the details and mysteries of his business, but in these days this is no longer possible. The manager of a great commercial undertaking has no time to train his assistants, and they must come to him with that knowledge of principles which renders it possible to employ them usefully in some department from the outset. For them the Technical college has been founded with its workshops, its laboratories, its drawing office and lecture room, and there under the direction of men of great practical experience they learn the elements of the sciences underlying modern manufacturing processes, to experiment and to observe and to draw correct deductions from their experimental work, to use machinery and to draw and design. Equipped with the training of the college the students pass out into the world able to make the most of their subsequent opportunities for gaining practical experience. The reports of the Royal Commissioners on Technical Instruction revealed how much the material prosperity of Germany and Switzerland was due to their excellent systems of education, and that in Great Britain in the matter of Technical education, an extension of the methods of education which had been initiated by the Livery Companies of London was eminently desirable to enable our manufacturers to compete on even terms with their foreign rivals.

Into the history of the development of Technical education in England it is impossible for me now to enter. Summarizing the position at the present time, I may say that the old methods have been found wanting, and that the new have not yet received the impress of authority which lapse of time will bring them. Experiments are being conducted on every hand, and much money is being spent, and probably not a little wasted. It may, however, perhaps, be of interest to you if I briefly describe the nature of the work carried on in the colleges founded by the City and Guilds of London, in which I spent some 4½ years. It was in 1883 that the Finsbury Technical College was started, and I was among the first batch of students who joined. The day courses were arranged for electrical and mechanical engineers, and for those who purposed afterwards engaging in industries and manufactures in which a knowledge of chemical science is all-important. At that time electrical engineering was considered to have a most brilliant future before it, and most of the students were attached

to that department of the college, but I joined the mechanical department, and my subsequent experience leads me to think that the training I there obtained was more generally useful to one who had no very definite ideas about his future career. Except the majority of the chemical students most of us were similarly situated, and we did our work for its own sake and not in order that we might pass examinations. Some of us entered the college with a fair knowledge of elementary science which we found very useful, and there we attended lectures on mathematics, heat, chemistry, mechanics, electricity, and the steam-engine, but the greater part of our time was spent in the splendidly-equipped laboratories going through specially arranged courses of experimental work in physical and mechanical science, in electrical engineering and in chemistry, or in the workshops where we stoked the boiler, looked after the engine and practised carpentry and fitting and did simple work with the commoner machine tools, or in the drawing office where we learned freehand and mechanical drawing, most of the latter work being done from measurements of machinery in the workshops. We got very little encouragement to read books, and most of our information was acquired practically. The course of instruction only lasted two years, and at its conclusion the most of the students began practical life as apprentices or pupils in works or manufactories, but with a few others, I stayed on some time, which I chiefly spent at experimental work, waiting for the opening of the Central Institution at South Kensington, which was then being started by the City and Guilds of London to afford more advanced Technical instruction than could be given to the class of students who attended the Finsbury Technical College. At South Kensington I spent 2½ years going through courses of instruction more advanced but similar to those I had previously attended. At the end of that time most of us went into mechanical engineering works, as workmen, to gain practical experience of the kind that no college can ever give, and to make the acquaintance of the British workman, whose prejudices and peculiarities it is necessary to become intimately familiar with, if one wishes to be able to successfully manage them afterwards. We were the first productions of this modern phase of Technical education in England, and in the works we were looked upon with suspicion and distrust, which, however I am glad to say, was in the majority of cases ill-founded and soon disappeared, and I believe that at the present time the majority of my contemporaries have no occasion to complain of their want of success in the various occupations they have drifted into. Since then the number of Technical colleges and students has increased enormously in Great Britain, and though sufficient time has not yet elapsed to enable broad comparisons to be made between the

new and old methods of training, there is no complaint to be heard anywhere of a dearth of young men capable of carrying on responsible executive duties.

From this very brief description of the way the City and Guilds of London set about solving the problem of higher Technical education, I want you to be impressed with the fact that the instruction was mostly of a practical kind in which the student gathered his knowledge for himself and learnt more from his experimental failures, as a rule, than he did from his successes. It was, I believe, education in the truest sense of the word, hand and eye were trained to work together, powers of observation were developed, and the faculty of close and acute reasoning stimulated by constant exercise. College examinations were held once a year, but we were particularly requested not to read for them and to go on with our work regularly and steadily to the end, an injunction we were only too glad to obey, and I am sure that taking all things into consideration we did better and more useful work without the bugbear of examinations always before our eyes than we could have possibly done had the application of such a stimulus been deemed necessary to us. In the electrical and chemical departments the instruction was undoubtedly more specialized, and I cannot help thinking, less satisfactory than in the engineering. For those who aspire to rise high in the ranks of industrial workers, the foundations upon which they are to build up their specialized experience must be broad, and as every modern industrial enterprise depends upon the more or less extensive employment of some form of motive power and machinery, so the nearer the preliminary training approximates to that of a mechanical engineer, the more satisfactory and useful it will be found to be afterwards. In the Finsbury and South Kensington Technical Colleges the so-called engineer students enjoyed in addition very favourable opportunities for studying electrical and chemical science and technology, and those who made the most of them passed out better prepared I think in the long run to achieve success even in those industries which more peculiarly fall within the province of the electrical engineer and the manufacturing chemist.

I have selected these colleges of the City and Guilds of London, not only because I can speak of them from personal experience, but because they are generally admitted, now, to be worked on lines which, so far as can be judged from our present standpoint, afford the most satisfactory solution of the problem of higher Technical education as it presents itself in England. In most of the great provincial towns there are now somewhat similar institutions, though naturally as each town is more or less the centre of some particular trade or industry there is in their courses

of instruction a greater tendency to specialization, and not infrequently there are one or more departments organized for the express purpose of teaching the technics of these trades. Such departments are mainly patronized by students in some way or other intimately connected with the local trades, and in a position therefore to determine at the time they enter the college the nature of their future calling. The training they receive must be a very valuable preparation for practical work, but I should imagine, since I cannot speak from certain knowledge, that it in no way does away with the necessity of what is equivalent to a period of apprenticeship, though in these days it may not be so styled.

Besides Technical education of the kind I have been speaking of, it has been found necessary, as I have already mentioned, to provide facilities for training the artizans who form the great bulk of industrial workers. The tendency is ever towards turning operative apprentices into mere machine tenders, or to keep them performing year in and year out the same mechanical operations at which no doubt they attain extraordinary dexterity, but which narrow their minds and numb their intelligence. To counteract this, and to enable men to learn not part but the whole of a trade, Technical schools are necessary. Not one of the least advantages which the artizan derives from them is the correct appreciation of his own position as a factor in the great industrial system of which he forms a part, which supplies the necessary stimulus to enable him to adapt himself to the changed conditions of production and to learn his trade outside the hours he is engaged in earning his living. Probably not a little of the cry for shorter hours, of which so much has been heard in recent years, is due to the fact that the younger workmen want, and in the end undoubtedly will get, more leisure time to spend, not as is so generally assumed in the public house or beer shop, but in the Technical school where they are endeavouring to render themselves more skilled and useful artizans, and therefore less dependant on the maintenance of the present order of things. "The labourer is worthy of his hire," but the demand for labourers, as we term them in England, or coolies, as they are called in India, is yearly decreasing, as their services are being replaced by machinery, and the value of their "hire" is a gradually diminishing quantity. The factory system gives employment to a large number of young people, whose services, when they arrive at maturity, are dispensed with to make room for other children, and they are thrown on the world without resources unless through the medium of evening Technical schools they have been able to find a satisfactory substitute for the old apprenticeship system and have learned something, before they become men, which renders them worth men's wages.

England is essentially a manufacturing country, and in dwelling on Technical education we are apt to forget that its agricultural interests are of immense importance, notwithstanding the fact that one-half the food-supplies of its inhabitants are imported from foreign countries, and that the progress of modern science has modified methods of cultivation and rendered it desirable, if not absolutely necessary, that the would-be farmer should receive preliminary scientific training in the principles underlying the practices of his calling. As yet, however, the training of the majority of farmers proceeds on the old lines, and the agricultural colleges of Cirencester and Downton are largely filled with students who do not intend to cultivate the soil themselves though the prospects before them render it probable that a scientific agricultural education would be indirectly of much value. There is no doubt that the defective system of agricultural education in vogue in Great Britain is to some extent remedied by the diffusion of technical information through the medium of the journals of the great Agricultural Societies and the annual exhibitions which they hold, but it is equally certain that much of the prevailing agricultural distress is due to inefficient farming, and that the most certain means of combating successfully the difficulties caused by the low prices to which foodstuffs have been forced, by the competition of foreign countries in an open market, is to bring to English farming more scientific knowledge.

Thus far I have tried to give you some idea of the state of Technical education in England, and to show you how important and necessary it is to the maintenance of the commercial and industrial supremacy which we have so long enjoyed. The vast extension of the bounds of human knowledge has widened the field over which we must travel in our youths so much that it is necessary to economize our stock of energy and make the most of the time available. It is the aim of Technical education to accomplish this and to store the mind with useful knowledge without in any way compromising the object of all true education which is the training of the mental faculties with which we are endowed.

I am afraid I have taken up too much of the time allowed to me with Technical education in England, but it was really necessary that you should understand something about it in order to follow what I have to say on the Indian side of the question. Here the circumstances are utterly and totally different. I need not go into them in detail, as you must all be well aware of the great contrast there is between the inhabitants of Great Britain and India, both in their material sourroundings and in their temperament, habits and general culture. The cultivation of the soil is the occupation of the greater part of the people of India,

and the surplus produce of the land forms the bulk of the export trade. Manufactures are in a nascent state, and as yet give employment to but a small percentage of the population, whilst the direction and management of such enterprises is almost entirely in the hands of persons of foreign birth and training. Private enterprise is very nearly dormant, and the surplus wealth or capital is hoarded in the form of bullion or jewels, and is therefore entirely unproductive. It is evident that under these circumstances there can be no great demand for Technical education of the kind I have been talking of, but such as does exist is not inadequately met by the institutions which have been developed during the last ten years. It is no use taking an uneducated person and attempting to give him a Technical training. In time, you may convert him into a rule-of-thumb workman, but it would be useless to instruct him in the scientific principles underlying his trade, as he would be unable to grasp them. A sound general education must come first, and hitherto in this Presidency, as I have already pointed out, there has been no lack of employment for persons possessed of such a qualification. In the future it is probable that circumstances will be different, and that there will be a surplus of educated men who will turn to Technical education in the hope that it will prove to them a passport into "other walks of life" in which they may earn a respectable livelihood. The spread of the study of Western science is making steady progress among the students of the University, and it may be naturally expected that they will be among the first to turn from the beaten tracks and carve out for themselves careers in the new fields which are opening out to them through the growing material and industrial prosperity of the country. At first no doubt the various Government services in which a preliminary Technical training is required, will receive greater attention than hitherto, and a superior class of students, than formerly did so, will flock to such institutions as the the College of Engineering, and to them I should have no hesitation in saying that they will find there facilities for acquiring Technical knowledge of the kind required for the work which is carried on in the P. W. D. and under the Local Fund Boards, which will clearly prove that the Government of this Presidency fully and completely recognizes its responsibility in this matter. The demand for good subordinate engineers, surveyors and draughtsmen is very large, and has been very clearly expressed, and to supply the want no expense, that was really necessary, has been spared to make their courses of instruction as efficient as possible.

Some thirteen years ago I was present at the opening of the Finsbury Technical College and heard the inaugural address delivered by Sir Philip

Magnus, and I remember he advised those of his audience who wanted to know what was meant by Technical education, to visit the college when the students were at work, and to apply the term "Technical" to the education going on there. Similarly I would say to you, if you want to know what Technical education in Madras really means, come and see what is going on at the Engineering College. Civil engineering and the building trades are the occupations for which the students are mainly trained, but the importance of a practical acquaintance with mechanical engineering is fully recognized, and there would not be any difficulty in providing instruction, if there were any demand for it, to students who wished to be prepared for what may be termed productive trades and industries. In conjunction with the physical and chemical departments of your own college, it would be possible to supply a thoroughly sound Technical training suitable for electrical engineers and persons who intended to engage in the great variety of trades which are based upon chemical processes, such as tanning and dyeing, or alkali, soap and paper manufactures. At present there appears to be no demand for Technical education other than that supplied by the College of Engineering, but when it does arise you will see that preparation has been made to fully meet it. I do not mean to say that the proposals of the Committee which, in reporting on the future working of the School of Arts, recommended that special instruction should be provided in dyeing and tanning, could be carried out conveniently by any association of the colleges in Chepâk, but I am certain that such specialised Technical instruction will be of little real value unless it be preceded or accompanied by the more general Technical training which can now be given.

I have been led into this reference to the College of Engineering mainly because in the recent discussions on Technical education it has to a large extent been assumed, by one side at least, that this institution is either an appanage of the Public Works Department, or a dignified professional college, training its students for the academic courses of the University, and possessed of no desire to associate itself with the material advancement of the country.

I must confess that I hold no very extravagant views on this subject, and I do not think that Technical education in Madras will by itself effect very much. It will certainly not create new industries, and it is at least doubtful if it will revive old ones. The establishment of a Metallurgical school may some day be necessary if ever it becomes practicable to smelt the rich ores of iron which so abundantly exist in the south of India, but at the present time neither the institution of examinations in metallurgy, nor the teaching of that subject according to

the most approved modern methods, will advance, in the least, the prospects of an iron trade in Madras or Bengal. The gradually increasing facilities for the profitable utilisation of water power through the medium of the electric current, may in the future effect a revolution in our methods of production, and enable us to establish important industries in this Presidency, but the difficulties in the way will not be lessened by the fact that mechanical and electrical engineering can be taught in Madras. Where industries exist it is possible that Technical education may improve them, but if it were certainly so, and if there was money to be made out of them, it seems strange that none of the many shrewd men of business in Madras have not already turned their attention to the matter. European Technical skill of the highest quality is always available, and it cannot be expected that anything which can be done out here in the matter of education, will materially alter the prevailing conditions. On the other hand, if new industries are started, and a demand for Technical training follows, there is not likely to be any serious difficulty in meeting it, so far as is possible with the people of this country.

In the railway workshops, in the cotton-mills, in the gold mines of Mysore, and in other modern industrial enterprises which have arisen in Madras, you will find that the foremen and others in responsible positions, are nearly all Europeans, who are paid high wages, because it has been found impossible to rely on native labour for work of this kind. Something more than Technical education will be required to change the character of the Hindu race and supply those deficiencies which it now lacks, and which are essentially the birthright and possession of only dominant races. If the people of India had been cast in the same mould as the people of Japan, Technical education would have developed out here with the same extraordinary rapidity and with the same extraordinary results that have been produced in those isles of the extreme East. But the fact is, you are not a practical people, and the enervating influence of the tropical temperature in which you live for the whole year has to a large extent deprived you of that energy and go, that love of independence and responsibility which is necessary to success in practical life. From the experience of the past, we cannot be sanguine of effecting any great change in the future except by degrees so slow that generations will have to pass away before its results become appreciable. You are representatives of the intellect of your country, but you will have to associate that intellectual superiority with a similar physical superiority, coupled with manual skill and dexterity before Technical education can achieve much more than it has done already. When that time comes you will be able to manage your own affairs, and the British work in India will have been accomplished.

The rigid line of demarcation, which separates the intellectual from the labouring classes, which divides those who think from those who toil, is the main obstacle in the way of progress, and the first steps should be taken with a view to breaking down these distinctions. Something in this direction has already been achieved, some of the lower classes are being educated, and some individuals belonging to the higher castes no longer look on manual labour as derogatory to them. The introduction of manual training into the primary schools would, if it were possible, accomplish much, and the establishment of voluntary workshops in the high schools and colleges, where the boys, who wished to do so, could practice carpentry, wood-carving, fret-work, turning, modelling or even cardboard work, would enable those who, in the primary schools, had developed any taste that way to cultivate it further. The great difficulty which must be overcome before such schemes as these can be carried out, is to provide suitable instructors, which leads me to think that Technical education must work its way downwards from the few to the many, from the higher classes to the lower, from the science students who become practical men and able to work with their hands, to the working men who want Technical training to enable them to do better work. Unhandiness, according to Mr. F. J. E. Spring, is the great disease from which middle class India is suffering, and the measures which are taken to promote Technical education can only be successful if they strike deep at the roots of this all-prevalent complaint.

To any of you who may be thinking of following the advice of Mr. Justice Subrahmanya Aiyar, of turning aside from the beaten tracks, and of endeavouring to forge out for yourselves industrial careers, I would say,—make up your minds about it once for all, do not think of keeping it as a second string to your bow to be made use of if you fail to pass some examination or to obtain admission into the public service. It is very far from being my object to deter you from such a course, but I warn you that, as pioneers, you will have many difficulties and much prejudice to overcome, and that unless you are prepared for much hard work it would be better for you not to make the attempt. No matter what you may propose to do in after life, you should at the outset acquire a practical knowledge of mechanical engineering, become familiar with machinery, and acquire a fair degree of skill in working both wood and metals. If you could get admission into a good workshop and foundry, either as apprentices paying a premium, or, better still, as

ordinary hands receiving daily cooly or monthly pay, and would stay there four or five years, at the end of that time you could profitably spend a year or two in a drawing office or in the Engineering College, after which you would be in a position to take up some special manufacturing or industrial work with a fair prospect of success. As an alternative you might join the Engineering College first, but I am inclined to think that the sooner you make the acquaintance of practical work, carried on commercially, the better. One advantage of the course I recommend is that if after a time you find yourselves unfitted for the work, you can draw back more readily and with the assurance that the time you have spent is not wasted entirely, as you will have undergone an experience which will be useful to you. If you go to the college first, you will spend two or three years there, and only after leaving it will you be able to discover with certainty the congenialness of the prospects before you. The "unhandiness" of which I have spoken is not merely lack of manual skill, but a feeling of absolute helplessness which is apparent the moment you set about practical work. It will take years to make you handy and useful men, and to enable you to accumulate that fund of experience which alone can make you resourceful, and therefore fit to be placed in independent charge of manufacturing operations, or to carry on by yourself any kind of business involving the management of machinery and the control of working men.

I have spoken to you on Technical education, knowing from experience the kind of training you have received, and I have endeavoured to put plainly before you the prospects you have of engaging with success in those "walks of life" which have hitherto been mainly filled by Europeans, who have been brought out here to fill positions it was found impossible to get suitably trained natives to occupy them. Your education has so far been mainly a literary one, but some of you have studied mathematics and the physical sciences, and as a preliminary to Technical education, such studies ought to be of great value. But you must remember that these sciences are merely tools, which you must learn to use and to apply in your every day work, and the knowledge that you get of them, need not necessarily be deep, but it must be thorough, and in after life if you should chance to be occupied with work which requires more than a general knowledge of some particular science, your early training should enable you to acquire what you want easily and quickly. If when you leave this college you could determine the nature of your future occupation, it would be possible to give you more detailed advice, but as it is, the majority of you must prepare yourselves to take whatever may come in your way, and the course of training

I have indicated will, I think, best enable you to make the most of your opportunities.

With regard to the Technical education of the working classes, the time has not yet arrived in Madras for much to be done. The standard of general education is too low among the artizans for them to be either desirous of specialized instruction, or capable of making use of it were it offered them. For any thing better than the crude productions of the bazaar there does not seem to be any great demand. The native potters, copper-smiths, carpenters and iron-workers still satisfy the simple tastes and supply the household utensils of the bulk of the people. Changes are slowly taking place which are the natural result of contact here and there with European ideas and civilization, and it is probable that there is in progress a gradual elevation of the standard of skill, but how far this is due to the improved supply of raw materials it is impossible to say.

There is, however, besides the purely bazaar artizan, another gradually increasing body of men who have been trained under European supervision, or who have adapted themselves to some extent to European methods and requirements, and it is amongst them that we must look for the first symptoms of a demand for Technical instruction. The advantages derived from being able to draw are very readily recognized, and such institutions as the School of Arts are through their drawing classes undoubtedly doing really useful technical work.

In the centres of what may be termed European industry, as for instance the neighbourhood of Perambore, where the railway workshops, the cotton-mills, the iron-works and several other smaller industries are congregated, Technical schools might be opened with some chance of success. But to ensure this, the instruction must be of an eminently practical character, must be conveyed in the vernacular, and must be warmly supported by the employers of the locality who may be expected to benefit by the increased intelligence and skill of their employees. We have an artizan class in the College of Engineering, which is largely attended, and it may therefore be assumed to meet a distinct want, but the persons who attend it are not artizans, for Chepâk is too far away from the scenes of their daily labours for workmen to come there after a day's work is done. Technical Institutes, intended for the education of students, may be built on any covenient site and in any part of a town, but if it is hoped to draw in the working man, then they must be situated near his home. It is impossible to expect boys and men to do a day's work and then walk two or three miles, there and back, to attend evening classes. The College of Engineering in Chepâk, the buildings termed the Victoria Technical Institute in the Pantheon Road, or even the School of

Arts and Industries in the Poonamallee Road, are all too far away from the homes of those artizans who might be expected to benefit from attendance at a Technical school, for any hopes to be realized that they will be attracted to classes held in any of these buildings. In the North of Madras it might be otherwise, and if I might be permitted to make a suggestion to the Council of the Victoria Technical Institute, I would advise them to start work in the Perambore division of Madras, and endeavour to meet the modest demands for Technical instruction of the large number of artizans who work there. In Bombay there is a similar Institute working, as might be expected in a city of such great manufacturing importance, on a large scale, and supplying, if one may judge from the numbers attending it, a much needed want. On a smaller scale a school in Madras, founded with the avowed object of affording instruction to those engaged in the mechanical arts, teaching its students that which will be useful to them in their daily avocations, and making no attempt to prepare them for the ordeals of the examination room, is an experiment which such a body as the Victoria Technical Institute might undertake with the funds at their disposal, and I cannot help thinking that, directed by a council composed of so many men, eminently in touch with the industrial enterprises of Madras, it would meet with great success.

In conclusion, I must remind you that I have not said one word about the Technical training of those engaged in agriculture, the occupation of by far the greatest number of people in this Presidency. Expert opinion seems to differ very much as to what should be done, how it should be done, or even as to whether it is necessary to do any thing at all. At any rate the questions which require solution in connection with agricultural education are so very different from those I have just now been dealing with, that though I fully recognize that in this country it ought to be the most important branch of Technical education, I do not think the present is a suitable occasion on which to treat it.

...Engineer ... for the Summer Vacation in May and June, he will find it possible to inspect certain schools during those months and the remaining schools when he can conveniently arrange for the same. The favour of early orders is requested on this letter.

I have the honour to be,

Sir,

Your most obedient servant,

G H Stuart

Ag. Director of Public Instruction.

Educational (1899) Department.

CURRENT No. 62

39 / 26/4/99 / 5/5 / 10/5/99 / Ltr / Papers / Ltr / Papers

From The Director of Public Instruction Madras

Order

No. 4671

Dated 22nd April 1899.

Received

Registered 25-4-99

Enclosures Proc Surgical

Spare copies

SUBJECT.

Submitting proposals for the establishment of a "School of Metal-work" in Madras.

BACK PAPERS.

G.O.	No.	Department.	Date.
18	2	1	98 C/F
1243	7	8	17-12-98 C/F
751	8	2-12-98	
688	8	5-11-98	
547	9	30-8-98	
578	9	18-8-98	

FURTHER PAPERS.

G.O.	No.	Department.	Date.

426 8 14-7-98
329 8 27-5-98
64 8 4-2-98
35 8 26-1-98
724 8 10-12-97

RR No 2157/99

Department of Public Instruction.
School of Arts. Madras.

No. 538 dated "15" February 1899.

Despatched 16 FEB 1899
Received 1899.

DIRECTOR OF PUBLIC INSTRUCTION RECEIVED 16 FEB. 1899 R. R. No. MADRAS.

Subject

Forwarding proposals for the future working of the Aluminium Industry with suggestions regarding the ~~open~~ separation of the metal work Deptt from the School of Arts and formation of the same into a separate School.

1899
Encls. No. Deptt
G. No.

N.B.—All communications re Aluminium should be addressed to the Officer in charge of the Aluminium Department, School of Arts.

ALUMINIUM DEPA

School of Arts

Madras, 15" February 189

No. 538

From

THE OFFICER IN CHARGE OF THE
ALUMINIUM DEPARTMENT,
SCHOOL OF ARTS,
Madras,

To

THE Director of Public Instruction
Madras.

SIR,

I have the honour to forward the following proposals for the future working of the Aluminium Industry, now carried on under my supervision in the School of Arts. I have had interviews on the subject with H. E. The Governor and the Hon. Mr. A. J. Arundel C.S.I and I have endeavoured, so far as I am able, to prepare a scheme on the lines they seem to consider best adapted to meet the exceptional circumstances which have arisen in connection with this departure from the lines on which technical education has hitherto been worked in this Presidency.

As a history of the Industry in Madras has already been communicated to you in the various reports which from time to time, I have submitted, it appears to me unnecessary to do more than submit a brief outline of the policy I propose to pursue and of the methods to be adopted in carrying it out.

The idea of introducing the working of Aluminium as an industry in technical schools was first proposed in a report on the Madura Technical Institute submitted to you on the 12" August 1896, (vide para 10.) and reviewed in your Proceedings No 10248 of 18" September 1896. On my return from furlough in November 1897, I brought out some aluminium with me and after experimenting with it in the School of Arts I ordered at my own risk, a ton of the metal to be sent out to Madras. It arrived at the end of March 1898 and in the 10½ months which have elapsed since then I have manufactured and sold over Rs. nt 40,000 worth of Aluminium go. do and off by

the end of the official year I expect the total sales will reach half a lac of rupees. Besides this the industry has been carried on by two private firms in Madras, by the Madura Technical Institute and the Bombay Victoria — Jubilee Technical Institute. Altogether I estimate that during the first 12 months' working in this country, a business amounting to Rs. 75,000 will have been done whilst the imports of European made wares into Bombay and Calcutta will have been increased by about a similar amount. In the School of Arts I estimate that a nett profit of Rs. 12,000 will have been made, the whole of which has been invested in developing the trade. The maximum amount of Government capital locked up in the Industry excluding the profits has at no time exceeded Rs. 8000. The business has now grown beyond the capacity of the pre-
-nt workshops of the School of Arts
-d from the 1st April of this year

As

I would suggest that it be carried on by a staff entirely independent of the School of Arts as at present constituted. New workshops could be erected for a comparatively small amount say Rs. 10,000 in the School compound and as fast as they become fit for occupation the buildings at present occupied could be vacated. It seems to me eminently undesirable to consider this development of the Aluminium industry as an isolated example of the outcome of expenditure in this Presidency on Technical Education. I should prefer to regard it as the first, and though possibly in the future it will prove to be the most important, yet only the first of a series of attempts to introduce ~~the~~ new or resuscitate old industries through the medium of our Technical Schools. So far it has been worked on commercial lines save in this important respect that every possible effort has been made to induce private enterprise to embark in the industry and every possible effort has been made

has been made to assist and foster the growth of business amongst those who have taken it up. Up to the present time a considerable amount of success has been attained and I should propose to pursue the same course till the trade is firmly established and then gradually relinquish it, to take up some other industrial development. How long this will take it is impossible to say, perhaps 2 years — perhaps 5 years.

During the last few years much has been written about the mineral wealth of India which has proved delusive or at any rate has not yet resulted in practical measures, but nothing about the supreme advantage which India possesses in its highly skilled and extremely cheap artizan labour. Individual firms, like Messrs. P. Orr & Sons have made the most of it and have realized large fortunes in consequence. So far in the School of Arts I have endeavoured to utilize this cheap labour in the most efficient way

possible and am now able to turn out articles at prices far below those paid for European machine made wares. It seems to me possible that by working on the same lines many other branches of the metal trades could be developed into flourishing industries and I would therefore suggest that the present is a favourable opportunity to establish a technical school in Madras, to work alongside, and in conjunction with the School of Arts, to be called the "Government School of Metal work". Already one lac of rupees has been provided in the Budget for next official year for the Aluminium Department of the School of Arts and the transfer of that amount to the proposed "School of Metal work" will be a sufficient provision of funds for the present. Of that amount, I would not contemplate spending more than Rs. 20,000 on new buildings and machinery and the expenditure of the balance on metal and labour will I hope be sufficient to enable me to effect sales to the extent of

Rs

Rs. 1,00,000 which would mean that at the end of the year the school would be established in working order and would have cost Government nothing at all. This may perhaps seem a very sanguine estimate but it is based upon the fact that during the present year I have started the industry, paid for all the experiments and failures and on sales amounting to half a lac have made a profit of about Rs 12,000. Next year I hope that the recent reduction in prices I have made to my agents will result in a greatly increased business and that the turn over may be considerably more than a lac of rupees.

The making of a profit is I consider undesirable, at the same time working in such an enormous field as India presents, I think there should be no loss to Government as the Pioneers of a new industry. Later on when private enterprise is able to compete it will be another matter – then the work of this Government Institution will cease to be commercial and become educational unless in the meantime we discover some other direction in which a similar method of working becomes feasible.

If the conduct of this enterprise is still to be entrusted to me as I presume it will be, I would only ask that the same degree of freedom should be allowed me that I have enjoyed during the past year. Of necessity the whole staff must be temporarily employed and their numbers will fluctuate from month to month and the power of appointing them, of fixing their pay and of determining the period of their service must rest with me.

The training of boys in the metalwork trade will be an important part of the work to be carried on which will necessitate the employment of the best maistries I can obtain and I should propose at the outset to start with 60 apprentices to whom would be paid scholarships amounting to Rs 360

a

a month; for their instruction I should want 3 maistries one on Rs. 50. and two on Rs. 40 a month and an assistant on Rs 10 a month making a total of Rs 140 or in all a total of Rs 500 a month equal to Rs. 6,000 for the year. The value of the materials used in instruction would be recovered from the sale of such articles as were made. This sum of Rs. 6,000 a year may fairly be charged to educational funds and should be deducted from the total expenditure in estimating whether a profit or a loss was made on the working of the school.

The establishment I should want to start with and which would be modified according to circumstances during the year would be :-

One head clerk	Rs. 75
One Assistant clerk	Rs. 30
One Storekeeper	Rs. 30
One Despatcher	Rs. 30
One Workshop Foreman	Rs. 60
One Assistant Foreman	Rs. 30
Three peons	Rs. 24
One Sweeper	Rs 6
	Rs. 285

If the work increased so as to justify extra expenditure it would I consider be desirable to allow me to increase the pay of any of my assistants who deserved it as I find by experience that in this way I can get better and more efficient service than in any other way. With respect to my own connection with this proposed School of Metal working I recognize that my work in it must in no way interfere with my duties as Professor of Engineering. During the greater part of last year I was practically in charge of the School of Arts and since November ~~1898~~ 1897. I have managed the whole of the business arising from the introduction of Aluminium in addition to which I have inspected and reported on all the Technical Schools in the Presidency. I am not aware that the Engineering College has in any way been neglected as I have usually spent in work there considerably more than the number of hours laid down in my time table. On the other hand I have given up the whole of my leisure

to this special work and I have received no extra remuneration for it. A certain measure of success has resulted from my efforts, a new industry has been partly established and a profit of over Rs 1000 a month has been realized in the Aluminium Department. I would therefore ask Government to give me a personal allowance of Rs. 500 per month from the 1st April 1898, when the working in Aluminium on a practical scale commenced, and to continue the same as Superintendent of the proposed School of Metal work.

Whether the above proposals be adopted in the form I have put them forward or not, it is I understand the intention of Government to separate the Aluminium Department from the rest of the School of Arts but whatever be the actual arrangement adopted so long as the work is carried on in the same compound there will, I think, be no difficulty in arranging that the metal work apprentices attend the drawing

classes and the English class as they now ... From an educational point of view this is most important and in view of the extreme ignorance of the artizan classes and their indifference if not actual contempt for technical instruction I should rather be inclined to increase the inducements offered to apprentices coming from the genuine artizan castes. This could be done by increasing the value of scholarships by the offer of prizes of considerable value and by encouraging the artizan workmen to bring their sons to work along with them, and by the establishment of a system of rewards for new designs, small improvements, new tools and so forth.

Besides Aluminium, silver, copper and brass are used in the School of Arts to some extent and ornamental work of very high quality is turned out. It is absolutely impossible to draw any rigid line of demarcation between utilitarian and artistic work and it therefore would

be advisable to transfer the whole of the metal work to the new school. At the present time any metal work other than Aluminium is nominally under the Superintendent of the School of Arts but it is mostly done by workmen employed by me and paid from the funds at my disposal. The total amount however is insignificant and the arrangement works well enough during this period of transition. In a school of metal work it will be necessary to arrange so that ~~the~~ apprentices shall gain experience in all kinds of metal work and it would be useless and a waste of money to maintain two sets of maistry instructors in say silver work one in the School of Arts and the other in the School of Metal work.

Although in all European countries, in America and in Australia, the greater part of the metal work employed is ~~trained~~ turned out by machinery, yet there is much which must be done by hand and is consequently

very expensive. For some time I have had the matter under consideration and I am in correspondence with business people in both England and Australia regarding the possibility of sending Indian hand made goods to these countries and finding a ready market for them. I have already sent to England a considerable quantity of artwork in metal and I have reason to believe that it would not be difficult to export and sell at remunerative rates enormous quantities of aluminium goods of the type which it does not pay to make by machinery or which can not be made by existing machinery. Freights are low and in the difference in rates of wages between India and England and Australia is enormous, so that I am firmly convinced that it only wants carefully working up to establish a valuable export trade. I am now trying to secure through the British Aluminium Company an experimental order, and if that is successful I have not the slight

do

doubt that many more will follow and that a wide field for enterprising metal workers will be opened up.

The above is briefly the lines upon which I would conduct the proposed school. Whilst it would come under the operation of such general and departmental rules as all Government Institutions must observe, if it is to be successful, the Superintendent must be allowed an unusual degree of freedom of action, and in the internal management must be allowed such powers as would ordinarily be vested in the hands of the Manager of any commercial enterprise. This I understand Government recognizes and is prepared to concede.

I have the honour to be,

Sir,

Your most obedient Servant

Alfred Chatterton.

Officer in charge of the

Alum. Depth.

R.R. 5590/90

Department of Aluminium

School

Enclosures D.P.I's No 467 & 2247

Public Instruction Department

of Arts, Madras.

No. al/132 dated 18th April 1899.

Submitting statements called for in D.P.I's D.M. No. 2657. dt. 17-iv-99. re the proposed School of Metal Work.

DESPATCHED 18 APR 1899

PUBLIC INSTRUCTION 18 APR 1899 MADRAS

189 Educl. Dept. Enclos. No 3 To C. No.

carry on the work[illegible] d it will not therefore be

N.B.—All communications *re* Aluminium should be addressed to the Officer in charge of the Aluminium Department, School of Arts.

ALUMINIUM DEPARTMENT,

School of Arts,

Madras, 18th April 1899.

No. al/132

From

Alfred Chatterton Esqr; B.Sc

THE OFFICER IN CHARGE OF THE

ALUMINIUM DEPARTMENT,

SCHOOL OF ARTS,

Madras,

To

THE Director of Public Instruction

Madras.

SIR,

In reference to your Official Memorandum No 4457 dated 17. IV. 99, I have the honour to submit the statements called for after conferring with Mr. Porterfield on the subject.

In my No 538 of the 15. ii. 99 I proposed the following establishment for the School of Metal work

Teaching branch

			Rs
One Maistry	@ 50/-	per month	50
two Maistries	@ 40/-	per month	80
one assistant	@ 10/-	per month	10
		Total	Rs 140

Office establishment

Off[illegible]	@ 75/-	per month	75
[illegible]k	@ 30/-	"	30
[illegible]	@ 30/-	"	[illegible]

			Rs
One Despatcher	@ 30/-	per month	30
one Workshop foreman	@ 60/-	"	60
One Assistant do	@ 30/-	"	30
Three peons	@ 8/-	"	24
One sweeper	@ 6/-	"	6
		Total	Rs 285

That is the total cost of the establishment would be Rs 425 per month. From the present sanctioned establishment of the School of Arts the following reductions could be made.

One Silversmith Maistry	(permanent)		50
one do do	(temporary)		40
one Goldsmith do		"	20
One pupil teacher do		"	12
		Total	Rs 122

The work of the School of Arts has very much increased in every department during the last year and the present sanctioned office establishment would not be more than is necessary to carry on the w[illegible] of the School efficiently and it will not therefore be p[illegible]

School

temporary clerks are specially employed for the Aluminium department and these men could be transferred to the School of Metal work, their pay is now met from the allotment for labour and the number employed varies with the amount of work in hand.

The effect of these proposals would be to diminish the establishment charges of the School of Arts by Rs 122 per mensem and to create new charges in the School of Metal work amounting to Rs 425 per month, the total increased cost to Government being Rs 303 per month. In my No 538 of 15. II. 99, I have already pointed out that so long as the Aluminium industry is in its present condition I expect that the sale proceeds will meet the entire charges of the School with the exception of a sum of Rs 6000 which is a fair charge for the education of 60 apprentices. Part of this

above charges
of 3rd

for establishment and part will be due to the payment of stipends for apprentices. It is not proposed to reduce the number of apprentices in the School of Arts so that no saving will be made there. Should my expectations be realized and the School of Metal work pay its own way there will be a charge of Rs 500 per mensem incurred in the School of Metal work and a saving of Rs 122 per mensem in the School of Arts so that the additional expense in the Educational Department will be only Rs 378 per mensem, against which can be set the fact that there will be a larger number of stipends available for apprentices in other Departments of the School of Arts.

I have the honour to be
Sir
Your most obedient Servant

Stipends therefore be paid
to the School

R.R. No. 3199 / 99 Enclosures 2 & No. 463 / C 22-4-99

Department of Public Instruction.

SCHOOL OF ARTS, MADRAS.

No. 750 , 6th March 1899.

DESPATCHED 6 MAR. 1899

Despatched 1899. Enclosures /

Received Spare copies

PUBLIC INSTRUCTION C.MAR.1899 MADRAS

Subject.

Returning with remarks, Mr Lewis's letter proposing to open a stall in the School of Arts Museum, for the sale of textile fabrics manufactured at the Reformatory School.

189 Dept. Encls. No. To

DEPARTMENT OF PUBLIC INSTRUCTION.

SCHOOL OF ARTS. MADRAS.

No. 750 Dated 6th March 1899.

From

W. D. PORTERFIELD, ESQ.,

SUPERINTENDENT,

SCHOOL OF ARTS, MADRAS.

To

THE Director of Public Instruction

Madras

SIR,

With reference to your Endorsement No 2345 of 28th February 1899, I have the honour to state that the suggestions contained in Mr Lewis' letter of opening a stall in the museum of the school of arts for the sale of Textile fabrics in cotton and silk seems to me one that would possess many advantages. Amongst others it would bring to the notice of the public generally an industry of this presidency that otherwise they would probably remain in ignorance of.

Arrangements as suggested by Mr Lewis for such a stall may well be made. The proposal that the prices of all articles be fixed and that only cash sales be permitted is an ex-

d 3th

the School of arts should be placed in charge of the Stall and allowed a Commission on sales of 12½% appears to me an undesirable one. Firstly because the Sergeant has sufficient duties in the school without having any extra ones of this kind put upon him, and secondly I think it highly undesirable that any servant of the school should be allowed to make money out of any articles that may be sold here. As it is my object to gradually place a number of articles manufactured in the school of arts in the museum, I would suggest that a separate museum keeper be appointed to look after the whole of the articles that would be exhibited there. This man should be paid from the school funds and the 12½% commiss on sales of fabrics proposed by Mr Lewis should be placed amongst the proceeds of sales of this School. The - .an at present in charge of the museum. was originally appointed as Gate ke only and he is not competent to

The very [illegible] to the School

look after the exhibits of the School of arts such as I propose to place them, and his present work could be done by any peon.

My proposal would be to supersede this man by another who would be responsible for all articles that are placed in the museum for sale or exhibition; and for this a man might be appointed on Rs 25 per mensem and he should also be required to deposit a cash security of Rs 100 on appointment.

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

W. D. Botterfield
Superintendent

No. 308

REFORMATORY SCHOOL, CHINGLEPUT,
17th February 1899.

From

J. P. Lewis Esq.,
DY. SUPERINTENDENT, in Ch:,
REFORMATORY SCHOOL, CHINGLEPUT,

To

THE DIRECTOR OF PUBLIC INSTRUCTION,
MADRAS.

SIR,

I have the honour to state that as suggested by Mr. Chatterton in para 6 of his letter dated 25th March 1898, forwarded to this office with your Pro:. No 7541 dated 12.7.98, I think a stall may be opened with advantage in the museum of the School of Arts, Madras, for the sale of the finished work of this School consisting chiefly of textile fabrics in cotton and silk. This is an old idea of mine, but the late Superintendent of the School, Mr. Holder, was strongly opposed to it.

2. I request that the approval of the present Superintendent of the School of Arts to be obtained to open the above stall. I anticipate no objection from him, as he seems to be interested in technical education generally. The "Serjeant" attached to the School

own account for the sale of drawing books and materials, may also look after the Reformatory School Stall. He may be allowed a Commission of 12½ per cent on actual sales to enable him to be responsible for the articles, to sell them and to keep and furnish the necessary accounts. As suggested by Mr. Chatterton, the prices will be fixed and only cash sales permitted. I request the favour of your sanction to these arrangements and also your permission to visit the School of Arts to arrange for the agency of the stall and the required accounts. I shall take with me the first supply of articles for the stall.

I have the honour to be,

Sir,

Your most obedient Servant,

H. H. Lewis

Dy Superintendent.
in Ch.

R.S. Cor. 4 200—5-8-98.

Department of Public Instruction

R.R. No. 2294/99

From

J. P. Lewis Esqr;

Dy. Superintendent, Mich.

Reformatory School,

Chingleput,

To

The Director of Public Instruction,

Madras.

SCHOOL OF ARTS RECEIVED DATE 6/3/99 MADRAS.

R. dt. 561/99

DIRECTOR OF PUBLIC INSTRUCTION RECEIVED 18 FEB. 1899 R. G. No. MADRAS.

EDUCATIONAL DEPARTMENT THE REFORMATORY 17 FEB. 99 SCHOOL.

No. 308, 17th February 1899.

Despatched 17th Febry 1899.
~~Dated~~
Received

Enclosures.

DESPATCHED 28 FEB 1899

~~Subject~~

~~Enclosure~~

Requesting sanction to open a stall in the School of Arts, Madras, for the sale of ~~Subject~~ textile fabrics of this school, and also permission to visit that school to arrange for the opening of the stall and the required accounts.

No 2345 of 28th Febry 99.

Referred to the Superintendent, School of Art, for favour of remarks and

By order,

Assistant

School of Arts,
Madras. 20th April 1899.

Financial Statement of Receipts and charges of the Aluminium Dept. for the year 1898-99.

Receipts.

Paid into the Bank on account of goods		39 12 1	
Sundry Debtors		11,739 12	
Stock of manufactured articles, 1904-11-0			
Do. Unfinished do. Land 5,173-8-0		8,078 3 0	
Stock of Materials		3,337 15 4	
Tools and plants less 2.5%		563 10 7	
Total.		62,839 15 7	

Charges.

1	Materials	3 1 1
2	Wages of Workmen	19 15 3
	Tools and plant	51 8 10
	Packing and freight	212 6 0
4	Advertisements	200 0 0
7	Petty carriage and Coolies	285 12 11
	Sundries	32 3 4
	Sundry Creditors	2,289 0 11
	Profit	11,752 13 3
	Total.	62,839 15 7

Ryru Chatterjee
Officer in charge of
the Al. Depts.

Enclosures to P.D. No. 4671 & 22.4.99

CURRENT No. 621

OFFICE OF THE DIRECTOR OF
PUBLIC INSTRUCTION,
Madras, 22nd April 1899.

No. 4671

From G.H.Stuart, M.A.,
THE HONORABLE MR. ~~D. DUNCAN, M.A., B.SC., LL.B~~,
Ag. DIRECTOR OF PUBLIC INSTRUCTION,
Madras,

To The Secretary to Government,
Educational Department,
Fort Saint George.

SIR,

I have the honour to submit for the favourable consideration and sanction of Government the following proposals for the establishment of a Government School of Metal-work in Madras.

A. 2. In its order No 39, dated 26th January 1898, Government was pleased, on Dr.Duncan's recommendation, to accord its sanction for an expenditure of Rs.1500 on the manufacture of aluminium vessels in the Madras School of Arts as an experimental measure. Mr.Chatterton, at whose suggestion the industry was introduced, reported in March 1898 that a larger amount could with advantage be expended on the work, and Dr.Duncan sanctioned accordingly a further allotment of Rs.2300 from savings in the budget provision for the School of Arts for 1897-98. Grants amounting to Rs.45000 were sanctioned by Government in the

B. No 518, Educational, dated 18th August 1898
C. No 688, Educational, dated 5th November 1898
No 1252, Financial, dated 20th December 1898

orders noted in the margin for expenditure on aluminium during 1898-99. Th[illegible]gh the personal and indefatigable exertions of Mr.Chatterto[illegible] were received for aluminium ware from all parts of India, from the enclosed statement furnished by him it will be seen that Rs.39121 have already been credited to Government from the sales of manufactured articles, and that in place of the

C.No.1664 in file 1898

189 Educl. Dept.
No. Schools

credit of the aluminium industry on the 31st March last Rs.21432 in stock-consisting of manufactured articles, stock and materials, taking outstandings and liabilities into account. The aluminium department was thus worked at a profit of nearly Rs.11753.

3. The temporary arrangement under which the aluminium department has been working, nominally as a part of the School of Arts, but virtually under the direct control of Mr.Chatterton and not of the Superintendent of the school, has no doubt been felt as a very anomalous and inconvenient arrangement in several ways owing to the rapid development of the industry. About the middle of February last (vide his letter No 538, dated 15th February 1899) Mr.Chatterton submitted certain suggestions to work the aluminium department as a separate institution under the designation of the "Government School of Metal-work". As the official year was about to close and as it was considered desirable to watch and note the transactions of one full year, Government was not immediately addressed on the subject. It was deemed inexpedient to maintain metal-work and jewellers' work departments at the School of Arts after the establishment of a separate metal--work school and Mr.Chatterton was required to report, after conferring with Mr.Porterfield, what reductions could be effected in the teaching and general establishments of the School of Arts in consequence of the transfer of the above departments to the metal-work school and his reply is herein enclosed. Reductions to the extent of Rs.122 are suggested in the teaching staff, but none under general establishments.

4. The following scale of establishment is recommended for the new school of metal-work:-

Teaching Staff.

		Rs.
One Maistry (permanent)	on Rs.50	
One do (temporary)	on Rs.40	
One do (do)	on Rs.40	
One Assistant (do)	on Rs.10	
		140

General Establishment.

One assistant clerk (temporary)	on Rs.25	
One Storekeeper (do)	on Rs.35	
One Depatching clerk (do)	on Rs.30	
One foreman (do)	on Rs.60	
One assistant foreman (do)	on Rs.30	
One attender (do)	on Rs.10	
Three peons (do) on (Rs.9,8,7)		Rs.24
One Sweeper (do)	on Rs. 6	
One Scavenger (do)	on Rs. 5	
		300

Stipends.

Sixty apprentices on Rs.6 each	360
Total	Rs. 800

5. The scale proposed under the teaching staff is the same as that suggested by Mr.Chatterton. The senior maistry will be on a permanent footing, which will provide for the transfer of the silversmith maistry on Rs.50 in the School of Arts who is on the permanent establishment.

6. I have adopted under general establishment the scale suggested by Mr.Chatterton with the following additions and changes. It is necessary that the Head Clerk should be on the permanent establishment as the employment of an experienced hand is desirable. The assistant clerk's pay has been fixed at Rs.25 instead of Rs.30, and for the storekeeper, who has much responsible work, a pay of Rs.35 is proposed in place of Rs.30. An attender on Rs.10 and a scavenger on Rs.5 will be found necessary. For the three peons I would fix Rs.9, Rs. , Rs.7 instead of a uniform rate of Rs.8.

7. There is now no separate museum-keeper at the School of Arts, the museum being looked after by a person designated gate--clerk and museum-keeper on Rs.10. Mr.Porterfield considers the employment of a separate museum-keeper on Rs.25 necessary to look after the museum, which he proposes to place a larger number of articles manufactured in the school. Samples of the aluminium ware will also be exhibited and in the museum will also be placed for exhibition and sale textile fabrics manufactured at the Reformat[illegible]

present gate-clerk and museum-keeper will be ~~unnecessary~~ unnecessary and the extra cost will thus be Rs.15. Mr.Porterfield's letter No 750, dated 6th March 1899, is enclosed for information.

8. The net increased cost on establishment and stipends will be Rs.(815-122) 693 a month, or Rs.8316 annually. This will not, I trust, be considered a heavy expenditure in the interests of the development of technical education in this Presidency. The initial outlay on additional buildings, workshops and tools and plant will not be heavy and can be met from the profits in the aluminium work. No special allotment has been made for the above expenditure in the current year's budget. But it can be met from the lump allotment for the aluminium industry.

9. In his letter No 538 Mr.Chatterton requests that, in consideration of his heavy work and in view of the large profits which has accrued to Government from the working of the aluminium department, he be given a personal allowance of Rs.500 per mensem with effect from 1st April 1898. Government is aware of the services he has rendered and I would recommend that he be given such bonus as Government may deem suitable. From the 1st instant I would recommend that, ~~as~~ as long as he is in charge of the School of Metal-work in addition to his duties at the College of Engineering, he be given a local allowance of Rs.300 a month, which, with the local allowance of Rs.200 recommended in my letter No 4437, dated 17th April 1899, as Inspector of technical, industrial and art schools, would bring up his extra allowance to Rs.500 monthly—-this allowance to be in consideration of the additional work and responsibilities devolving on him.

10. A special code of rules will be drawn up to regulate the work of the new school as soon as some experience is gained of its working and after Government pass orders on the reorganization of the School of Arts.

11. If the School of Metal-work developes to the extent that I expect, it will be necessary to consider the question of relieving Mr.Chatterton entirely of his work at the College of Engineering so that he can devote his whole time to the work of the new school and to the promotion of promising industries in this country, and the question of an appropriate salary for him can then be settled: but at present the above proposals are the only ones that I have to make.

I have the honour to be,

Sir,

Your most obedient servant,

G ff Stuart

Ag.Director of Public Instruction.

Fabrics

One

fabrics

Note.

so that he carlis

Educational Department.

Cur: No. 1635 of 1898, dated 13th December 1898, from Messrs. Best & Co, re the Aluminium industry in the School of Arts.

Order. No.
P.S.

In the letter read above, Messrs. Best & Co., the agents of the British Aluminium Company state that they contemplate forming a small syndicate to develop and promote the manufacture of aluminium articles and request Government to furnish information as to its intention in regard to the work now being carried on under the superintendence of Mr. Chatterton in the School of Arts. Messrs. Best & Co. further inquire whether Government is willing to allow Mr. Chatterton, in the event of the manufacture of aluminium being relinquished at the School of Arts, to confer with them as a Consulting Engineer or Member of an advisory Board.

2. The question of the continuance of the aluminium industry at the School of

raised in the above letter, forms part of the larger question of the

hatterton altogether from

development and encouragement of technical arts, trades and industries, which has for nearly ten years been a subject of solicitude with Government. Hitherto, however, the attention of Government has been mainly directed towards what may be termed the professional side of the question, and few measures have been adopted which would affect the artizan class, and little or nothing in the direction of developing any enterprise, -- whether industrial or commercial -- which would afford the prospect of employment to a considerable number of the working classes. An enterprise of this description has, however, been initiated in the aluminium industry which, introduced originally in March 1898 by the private efforts of Mr. Chatterton, has since, with the aid of considerable grants from Government, developed into an extensive business, and now bids fair not only to provide work for numerous workmen and agents but also to supply the wants of the people generally in respect of

of household and cooking utensils and the requirements of the various departments of Government. The advantages of the introduction of the metal into the country are undoubted, and the industry is, in the opinion of His Excellency the Governor in Council, certainly one which deserves to be fostered and encouraged by Government.

3. Before, however, any further steps can be taken in this direction, it is necessary that arrangements should be made with regard to (1) special accommodation for the industry, and

(2) its management.

(1) The industry has hitherto been carried on under the same roof with the School of Arts, whose work and development appears likely to be retarded and hindered in consequence. The Government considers that this may be obviated by allotting to the aluminium industry the back part of the compound of the School of Arts, where the necessary sheds can be built.

(2) With regard to the management of the industry, the Government resolves to withdraw Mr. Chatterton

his post as Professor ~~of Engineering~~ in the College of Engineering, and place him for a period of three years on the special duty of restoring, organising and developing those technical trades and industries, which appear most likely to prove successful in this Presidency, especially metal work and connected industries. Mr. Chatterton will, when placed on this special duty, draw up in consultation with the Director of Public Instruction and submit to Government a programme of work, and will travel freely over the Presidency enquiring into his special subjects and extending the aluminium industry, of which he will be in sole charge, subject to the control of the Director of Public Instruction. ~~while on this special duty~~. It will be permi~~ssible~~ Held to Mr. Chatterton with the previous sanction of Government to advise any firm that may, like Messrs. Best and Co., contemplate using the Periyar Falls for industrial machinery. while on this special duty Mr. Chatterton will receive the pay to which he is enti-

tled in the Educational Department and

an allowance of Rs 150/- a month as well as travelling allowance at the usual rate.

4. His Excellency the Governor in Council further considers that Mr. Chatterton should be given an honorarium of Rs 1500/- ~~[illegible]~~ as a substantial recognition from Government of the time and labour devoted and the pecuniary risk incurred by him in starting the aluminium industry. The Government of India will be addressed with a view to obtain the sanction of the Secretary of State to this grant and to placing Mr. Chatterton on the special duty already referred to.

5. In reply to their letter, Messrs. Best & Co. will be informed that the aluminium industry in the opinion of Government still requires fostering and developing before it is left to private enterprise, but that Government will be glad to see private enterprise engaging in the business, and that Mr. Chatterton cannot, while in the service of Government, be a Consulting Engineer to their firm or a member of

of an advisory Board.

ab
17/99.

To,

The Director of Public Instruction.

The Accountant-General

Messrs. Best and Co.

A. Chatterton Esquire.

Educational Department.

Letter

To the Secretary to the Government of India
Home Department.

Sir,

I am directed to address you on the subject of placing Mr. A. Chatterton of the Indian Educational Service on special duty under the following circumstances.

2. At the end of 1897, with the idea of introducing the working of aluminium as an industry in technical schools Mr. Chatterton brought out some aluminium from England and after experimenting with it in the Madras school of Arts ordered at his own risk a ton of the metal to be sent out to Madras. With this material the aluminium industry was started with the sanction of Government in connection with the School of Arts at the end of March 1898 at the suggestion and under the superintendence of Mr. Chatterton up to the close of 1898-99, grants to the extent of

Rs 48,8[illegible]

while Rs 39,121 were realized by the sale of aluminium articles, and there were in addition materials and articles in stock of the value of Rs 21,430. A provision of Rs. 1,00,000 has been made in the budget of the current year for the further develop-ment of the industry, the nature and extent of which is ~~already~~ clearly set forth in the accompanying copy of a Memorandum by Mr. Chatterton. Flag A.

3. His Excellency the Governor in Council is of opinion that the advantages to be gained by the introduction of aluminium into the country are established beyond a doubt, but considers that the development of this particular industry forms only a part of the general scheme for the development and encouragement of technical arts, trades, and industries, which has for upwards of ten years been engaging the attention of Government. Hitherto however, this Government has been mainly concerned with what may be termed the professional side of the question including subjects taught by the various

educational institutions established in Madras, such as civil engineering by the Engineering College, biology and sanitary science by the Medical College and agriculture by the Agricultural College, and few measures have been adopted calculated to affect the artizan classes or to provide employment for a large number of work people. The work connected with the introduction of aluminium in the School of Arts appears to His Excellency the Governor in Council to afford an excellent opportunity for Government to endeavour to ascertain what can be done ~~throughout the country~~ to improve the condition of the artizan population, to foster local enterprise and to encourage the investment of floating capital in productive concerns.

4. I am further to state that the aluminium industry at the School of Arts has up to the present time been superintended by Mr. Chatterton in his spare time but the business has increased so extensively that His Excellency the Governor in Council is apprehensive lest Mr.

Chatterton's duties as Professor at the Engineering College should suffer in consequence, and considers that the time has now arrived when special arrangements should be made for the control of the industry. This Government therefore proposes to withdraw Mr. Chatterton altogether from the College of Engineering and taking advantage of his special knowledge in technical and industrial matters to place him for a term of three years on the special duty of restoring, organising and developing those technical trades and industries which appear most likely to prove successful in this Presidency, especially metal work and connected industries. It will, I am to state, be necessary hereafter for Mr. Chatterton to draw up in consultation with the Director of Public Instruction a complete programme of work, but the main objects which he will have in view will be the following:-

(1) the development of the aluminium industry of which he will be in sole charge;

(2) the subjects taught [illegible]

(2) the inspection and reorganisation of existing industrial schools and the establishment of new ones;

(3) the development of export trade in connection with the work of the School of Arts and the Mofussil schools, and

(4) the establishment of a manual training class in the College of Engineering workshops. This Government considers that it is probable that at the end of three years the aluminium industry will have so far developed that it may be safely left to private enterprise, and that ~~at the end of that period~~ it will then be possible ~~to ascertain~~ to judge what further industrial developments are feasible. If these prove to be important, it will, I am to say, be necessary to consider the advisability of continuing to keep Mr. Chatterton on the same duty or of possibly making the appointment permanent. I am to add that it is proposed to give Mr. Chatterton, while on this special duty, the pay to which he is entitled in the Educational

Department.

Page 186 A Non Cand List.

Department Viz. Rs 1000 together with a allowance and deputation of Rs 150/- a month ~~and~~ travelling allowance at the usual rate, and I am to request that the sanction of the Secretary of State may be obtained to the appointment.

5. I am further to state that His Excellency the Governor in Council considers that Mr. Chatterton deserves a substantial recognition from the Government of the time and labour devoted and the pecuniary risks incurred by him in starting the aluminium industry, and proposes that he should be granted an honorarium of Rs 1500/-, for which I am to request that the sanction of the Secretary of State may be obtained.

ak
1/7/99.

Educational Department.

Cur: No. 639 of 1897, dated 1st June 1897, from the Director of Public Instruction.

~~Cur: No. 1655 of 1898, dated 18th Dec: 98, from Messrs. Best and Co.~~

Cur: No. 1669 of 1898, dated 20th Dec: 98, from the Financial Deptt.

Cur: No. 578 of 1899, dated 17th Apr: 99, from the Director of Public Instruction

Cur: No. 621 of 1899, dated 22nd Apr: 99, from do.

Order
P.S. No 504 & 5.8.99

The Government of India will be addressed.

Letter No 505 & 5.8.99.

To the Secretary to the Government of India, Home Department.

Sir,

I am directed to address you on the subject of the development and encouragement of technical trades and industries in Madras, which has for a considerable time past been occupying the attention of this Government.

2. The desirability of encouraging Technical Education and the necessity of improvement in the matter of practical and industrial training may be said to have been first prominently brought to the

Hon'ble Mr. Chatterton
H. E. the Governor

KW 28-7-99

v. page 7 of the note on Technical Education in India Flag S.

notice of Local Governments by the Reso-

lution of the Government of India ~~xxxxxxxx~~

~~(1)~~ Home Department ~~(Educt)~~ No. 10/309 dated

23rd October 1884, and ~~from that date~~ the subject has frequently been under the consideration

~~taken not the least important place in the~~

~~policy~~ of this Government. The first steps

taken in this Presidency in accordance with

the ~~orders~~ suggestions of the Government of India ~~with a view~~ to establish and extend a system

of technical and industrial training are

to be found in the scheme of technical

examinations which was submitted by Mr.

Grigg, then Director of Public Instruction,

in 1885. ~~The aim of this scheme, which~~

~~included in its scope a large variety~~ of

~~commercial, technical, scientific and~~

~~industrial subjects, was~~, to quote ~~Mr.~~

~~Grigg's~~ his own words, "to try the stimulating

effect of a scheme of examinations, supple-

mented by a system of liberal grants-in-

aid, making at the same time provision

for the supply, so urgently needed, of

well-instructed and professionally trained

teachers. ~~And, in addition to this~~, steps

~~should be~~ ~~will need~~ be taken to develop the ~~Scien-~~

Note. Dont print

In the note on Technical Edth referred to above it was stated that the Govt. of Madras alone of Provincial Govts had already taken action in accordance with the orders of Oct. 1884 with a view to establish or extend a system of Technical & Industrial training. Ark.

In organizing the development of a system of ~~technical~~ Technical Education Mr. Grigg, profiting by the experience of other countries, proposed, ~~to~~ qer

Page 4 Gen. no 377 Edd 3-6-85 dontprint Flag D.

He further proposed that

Scientific and art institutions now existing at the Presidency, so as to make them not only teach all or most of the Sciences and Arts, of which the need is at present felt, but also serve for the provision of a supply of Science and Art teachers and as models for private effort". The notification and syllabuses relating to these examinations were finally approved by Government in G. O. No. 198 Edl. dated ~~17th~~ 31st March 1886, and since that date have been periodically revised. The examinations are now regulated by notification No. ~~X~~ 18 ~~X~~ of the 25th January 1893, their object being as stated in the notification, to encourage scientific and technical instruction with special reference to manufactures and industries and generally to the necessities of the practical side of life. ~~The scheme as now constituted~~ These examinations include three grades, advanced, intermediate and elementary, and embrace as many as eighty-nine different subjects ranging fro bread-making and needlework to veterinar, science and electro-metallurgy.

Flag E dontprint

2 dontprint Page 13 Col a Pt 2 1893 Notification Regulations Examinations

3. ~~Apart from this scheme of examinations, what may be termed the profes-~~ ~~sional side of the question has been taken up with regard to a number of subjects by special Government institutions in Madras,~~ such as civil engineering by the Engineering College, biology and sanitary science by the Medical College, agriculture by the Agricultural College, and drawing by the School of Arts, while ~~considerable~~ grants-in-aid ~~have been~~ were made by this Government towards technical, industrial or art schools established in the Presidency by private agency, the total number of which at the end of 1897-98 was attended by 2,743 pupils. For a more detailed account of the work carried out by the Educational Department in regard to industrial and technical schools during the last few years, I refer you to the chapters on Special Education in the reports on Public Instruction for 1897-98 and for the quinquennium 1892-93 to 1896-97.

Whilst adopting this scheme of examinations for the development of Technical Education this Govt. at the same time recognised the necessity of providing for systematic instruction in certain subjects by special Govt. institutions, e.g.

Note
Excludes School of Arts Madras
Certain classes aided schools in Madras
such as Chengalvaraya Nayakar's
Commercial School, Anjuman,
St Patrick's Orphanage &c &c.
Pages 87 & 91 of the report on
Public Instruction for 1897-98
post print

His Excellency the Governor in Council,

Council, however, recognizes that the efforts hitherto made in the direction indicated in the preceding paras of this letter, have not been commensurate with the magnitude of the subject, and that few measures have been adopted calculated to affect the artisan class except by a few carpentry classes established in different parts of the country, and that little or nothing has been done in the direction of developing any enterprise - whether industrial or commercial - which would be likely to afford the prospect of employment to a considerable number of the working classes. The criticism levelled against Mr. Grigg's scheme of technical education that it was merely a scheme of examinations and nothing more may not have been wholly deserved, but this Government cannot but recognize that the system of examinations is professional and theoretical rather than practical and leaves the development of the artisan and his industries quite untouched. It is pertinent to this aspect of the subject to quote the following extracts from Sir Alfred Croft's review of

post print
Want Construction
except the establishment of a few &c -
post print

c.f. p. 153 of the Reforton Public Instruction for 1888-89.
post print

technical
instruction materials a[illegible]
dangerous, undesirable

Education in India in 1886. In speaking of general schemes of Technical Instruction ~~he said~~ in ~~para 224:~~

"It is obvious.....that apart from the higher instruction in law, medicine, and engineering, required for the attainment of University degrees, there is not as yet in India anything like a general or systematic provision of technical instruction such as the needs of an advanced community would seem to demand. The provision that exists is partial and fragmentary, directed by no guiding principle, often valuable and successful, but just as often missing success for reasons which are not very clear. The cry has gone ~~come~~ up for more technical instruction and that on two grounds: first, to increase the productive power of India as a manufacturing country; and secondly, to relieve the pressure on the learned and literate professions, for many years largely overcrowded, by providing for the educated classes a fresh and lucrative occupation in the lines of ~~commercial and manufacturing industry~~".

Council

N.B. This first part does not seem very pertinent to us

Italics not in the original

alteration required here MA

~~on Technical Instruction he~~ said:-

"....it is abundantly clear that technical education will not create trades; except in a few well-defined instances, it must follow in the wake of trades already established. Nor, when the trades exist, will technical education by itself create skilled artizans. The artizans must learn their trade independently; and the office of technical instruction is to make them more capable and skilful workmen, either by teaching them improved processes in the art which they already practise, or by educating the hand and eye in drawing, modelling, and the use of tools of precision, or by instructing the students in those branches of mathematics or science or technology with which their art is directly concerned. The exceptions to the rule are found in those cases in which the appliances of the art are so compact and handy that the school is itself the factory: such are the trades of wood-engraving, wood-carving, metal-chasing and similar applications of Fine Art to i[n]dustrials

Italics not in the original

ordinary type, not italics MA

industry. The School of Art may thus be made, as it has been made, the means not only of improving existing trades but of introducing them into places where they are as yet unknown". The possibility of the introduction of an industry hitherto unknown through the medium of the School of Arts, referred to in the latter portion of Sir Alfred Croft's remarks, made which was more than ten years ago, has, I am to say, been recently exemplified in a remarkable manner in the School of Arts, Madras, by the introduction of the aluminium industry by Mr. A. Chatterton, B.Sc., of the Indian Educational service. ~~The initiation of this industry appears to His Excellency the Governor in Council to afford an excellent opportunity for ascertaining the wants of the people, the indigenous industries that are capable of development and for increasing the demand and improving the quality of the work of native artizans.~~ The circumstances under which the industry has been introduced are briefly detailed below.

ordinary type

Council

5. At the end of 1897 with the idea of introducing the working of aluminium as a technical industry ~~into technical schools~~ Mr. Chatterton brought out some aluminium from England, and after experimenting with it in the School of Arts ordered at his own risk a ton of the metal to be sent out to Madras. With this material the aluminium industry was started ~~at the suggestion of~~ and under Mr Chatterton's ~~the~~ superintendence ~~of Mr. Chatterton,~~ the Government ~~having accorded~~ in January 1898 accorded its sanction for an expenditure of Rs 1,500 on the manufacture of aluminium vessels in the School of Arts as an experimental measure. In March 1898 a further allotment of Rs 2,300 was made towards the industry, and up to the close of 1898-99, grants to the extent of Rs 48,800 were sanctioned. Through the personal exertions of Mr. Chatterton extensive orders were received for aluminium ware from all parts of India, resulting by the end of 1898-99 in a sale of manufactured articles to the value of Rs 39,1[illegible] while there were in addition materials a[illegible]

technical industries

articles in stock of the value of Rs 21,430, the net profit to Government amounting to nearly Rs 11,753. A further provision of Rs 1,00,000 has been made in the budget of the current year for the further development of the industry, the nature and extent of which is clearly set forth in the accompanying copy of a Memorandum by Mr. Chatterton on the subject. I am to add that in consequence of the success attained by Mr. Chatterton in the School of Arts, the aluminium industry has been tentatively begun on by two private firms in Madras, by the Madura Technical Institute, and the Bombay Victoria Jubilee Technical Institute, and while it is estimated that during the first twelve months working in this country, a business amounting to Rs 75,000 has been carried on. In fine, industry has now developed into an extensive business, and bids fair not only to provide profitably for numerous workmen and agents

Flag A.

p. p 3 of Mr. Chatterton's letter enclosed with Current No. 621. Flag F.

does this mean that aluminium ware to the value of Rs 75000 has been sold? If so it would be desirable to say so —

but to supply the wants of the people in respect of household and cooking utensils and also the requirements of certain departments of Government.

6. The details given above will afford to the Government of India some idea of the growth which the aluminium industry has already attained. Of the advantages of the introduction of the metal into the country there can, I am to say, be no doubt, and the industry is one which clearly deserves to be fostered and extended, and encouraged by Government, but before the business can be left to private enterprize, which is the object to be ultimately attained. Some considerable time must elapse. It appears to this Government that that it should rather be regarded as the preliminary development of indigenous technical industries

the success attending the introduction of the Aleminium industry invites endeavour on a wider scale to

in this Presidency

or rescusitating old industries through

the medium of technical schools. ~~His~~

This attempt can fittingly be made and with excellent prospect of success by utilising still further the expert knowledge & skill of Mr Chatterton

~~Excellency the Governor in Council further~~

~~is of opinion that a practical solution of~~

~~this question may be found in putting an~~

~~expert on special duty, and considers that~~

~~Mr. Chatterton is especially suited from~~

~~his industrial knowledge and~~ for

~~the work.~~ ~~Mr. Chatterton~~, who at present

holds the post of Professor of Engineering

at the Engineering College, who has in his

leisure time and by his private efforts

introduced the aluminium industry ~~which~~

~~has proved~~ so successfully ~~he~~ has ~~moreover~~

devoted much attention to the study of

technical education, and has for some time

past undertaken to some extent the work of inspecting

technical, industrial, and art schools

without ~~any~~ extra remuneration. While ~~in~~

developing

~~charge of~~ the aluminium industry, he has

~~found it necessary to~~ tour extensively to

various industrial and commercial centres

for the purpose of extending the sale of

manufactured articles

and has thus been able to

but

Council

Current No. 570. 99.

Note taken from Mr. Chatterton's memorandum on "the development of Industries in the Madras Presidency" at Flag Z at Ab

needs to

ascertain local conditions and the prospect of introducing new industries. This

H.E. to G. in C.

~~Government~~ therefore proposes to withdraw Mr. Chatterton altogether from the College of Engineering, and taking advantage of his special knowledge in technical and industrial matters to place him for a term of three years on the special duty of restoring, organising and developing those technical trades and industries, especially metal work and connected industries, which appear most likely to prove successful in this Presidency. It will, I am to state, be necessary for Mr. Chatterton hereafter to draw up in consultation with the Director of Public Instruction a complete programme of work, but the following are among the ~~main~~ objects which he will have in view; ~~will be the following:~~

(1) the development of the aluminium industry; ~~of which he will be in sole charge;~~

(2) the inspection and reorganization of existing industrial schools and the establishment of new ones;

(3) the ~~initiation~~ development of ~~(4) the development of export~~ indigenous technical industries

H A

P = Printing
Q = Reading only.

~~of arts and the mofussil schools;~~ and

(4) (a) the establishment of a manual training class in the College of Engineering workshops, or elsewhere.

7. This Government considers that it is probable that at the end of three years the aluminium industry will have so far developed that it may be safely left to private enterprize, and that it will then be possible to judge what further industrial developments are feasible. If these prove to be important, it will, ~~I am to say,~~ be necessary to consider the advisability of ~~continuing to keep~~ retaining Mr. Chatterton on the same duty or possibly of making the appointment permanent. I am to add that it is proposed to give Mr. Chatterton, while on this special duty, the pay to which he is entitled in the Educational Department, Viz. Rs 1,000, together with a deputation allowance of Rs 150/- a month and travelling allowance at the usual rate, and I am to request that the sanction of the Secretary of State may be obtained to this appointment with the concurrence of the Govt of India

MA

Council

8. I am further to state that His Excellency the Governor in Council considers that Mr. Chatterton deserves a substantial recognition from the Government of the time and labour devoted and the pecuniary risks incurred by him in starting the aluminium industry, and proposes that he should be granted an honorarium of Rs 1,500/-, to which I am to request that the sanction of the Secretary of State may be obtained.

MA 26.7.99

ak 22/7/99

H.W. 28-7-99

A.2.14. 2.8.99

H.W. 24.7.99

True Extract

Asecretary

Council

tion of e

First copy sent to Press.

Returned for signature.

Despatched in print.

NUMBER OF COPIES REQUIRED. { Order complete. / Letter only. / Order complete with Letter.

READ AGAIN G.O., No. 189 DATED

CURRENT No.

ENCLOSURES TO C. No.

OF GOVERNMENT

LETTER OF GOVERNMENT.

STATEMENT WITH DITTO.

PAPERS NOT FILED UP, BEING MEANT FOR DESPATCH IN ORIGINAL

N.B.—
A = Print in full.
B = Not to be printed.
P = Print abstract only.
Q = Print heading only.