

Industrial conference 1908



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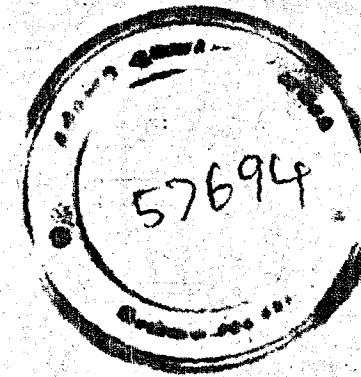
INDUSTRIAL CONFERENCE, 1908.

PAPER No. XII.

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of Science, Bangalore.

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It appears to the author of this note that the problems to be considered at the Conference fall under four distinct headings, namely:—

- (1) The organisation of a Department of Industrial Enquiry.
- (2) The provision of facilities for education and research in applied science.
- (3) The establishment of trade schools.
- (4) The improvement of existing industries and the introduction of new industries.

The need for the establishment of such a department is beyond question. It should serve as a means of securing co-operation between individuals engaged either in industrial and technical enterprises or in investigations, and of collecting and disseminating information. That the department should "control" technical and industrial education appears open to question, unless such control is of a very elastic character. On the one hand it is inadvisable to saddle the Director of the Department with the duties which the "control" of education usually carries. On the other it is doubtful if a centralised direction is desirable for technical departments.

The terms technique

Methods and objects of technical and industrial education.

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ஒப்பீட்டுமாதம் வருடம் 1989

செய்யப்பட்ட முடிவு வருடம் 1989

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problems as arise in carrying out manufacturing processes. Technical education

Technical and scientific education and research inseparable.

must be based upon scientific education;

there is, at the same time, a considerable danger that it may not be sufficiently practical, and this is particularly the case in India where it is difficult for a student to obtain any insight into manufacturing processes in the course of his training, or even after he has finished his course. On the other hand the scientific aspect of the training must not be lost sight of. A recent report on a certain industry in South Africa ascribed the slow rate of progress which was being made to the fact that the industry was in the hands of individuals calling them-

selves "practical men," who were, to quote from the report, "unable to understand or apply theory". Scientific and technical education are inseparable, and as I will point out later, this fact has an important bearing on the problem.

The object of industrial education is to train "hands" and perhaps foremen for works, and does not involve the teaching of general principles but only of their application. The training should be mainly manual,—for as far as the workman

is concerned even geometrical drawing or design involves

or no theory,—and only such book should be introduced as will enable man to make the best use of his accuracy and rapidity of work. Handicraft should be the training.

Organisation of technical and industrial education

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involving the establishment of technological institutes, and it is sometimes claimed that though India cannot afford to spend money on pure science the commercial salvation of the country lies in the development of applied science and technology. Reference is made to the progress made in Germany, and attention is called to the technical schools which have been established in that country, and also in America, Switzerland and elsewhere. That these institutions invariably contain fully-equipped departments of pure science, and that it is around these departments that the departments of technology centre, is lost sight of. The fact that in Germany the *Technische Hochschulen* arrived at their present position of independence from the Universities

is little more than an accident is only obvious to those who

are acquainted with the history of university development. Neither Germany nor Switzerland are wealthy countries, and their universities and technical schools are maintained in either case by the State, so that it is hardly likely that they would establish departments of pure science of the highest standard of excellence in their technical schools as well as in their universities if this were unnecessary. It follows that the establishment of independent and isolated departments of technology in India is likely to prove false economy rather than a royal road to success. Experience gained in France confirms this view.

It must not be forgotten that the creation of an industrial India does not imply the transplanting of industries into an exotic environment, or the aid of cheap labour, or the application of a rule-of-thumb management. It is necessary in almost every case to take into account the effect of the variation in the effects of climate, and this is not true of the trained man. The man who arrives in India must be trained to the conditions of the country.

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the case of imported industries which can only be successful when directed by highly competent men.

The majority of the problems which come under the notice of any one engaged in technical research are of so complex a character that the investigator is placed at a great disadvantage if he is unable to

consult colleagues engaged in branches of science and technology other than that in which he is himself an expert. Suppose, for instance, a problem connected with the manufacture of spirit is under consideration. It will best be solved by the co-operation of a chemist, a bacteriologist, and an Engineer. There are numberless problems in which the man who has time to devote his attention to pure chemistry can assist one who is obliged to give his attention to the technology of some branch of chemistry and is unable to follow the developments of his science.

While on the one hand technology is apt to become divorced from science, there is an even greater danger of the business side of the training being ignored altogether. It is not unusual to find that students who have been extremely well trained both in the theoretical and practical branches of their subject, so that they could erect a works and conduct the process with a certain amount of success, have not the slightest idea of the methods of carrying out the process at the cost of production, of the various matters of business generally. It is necessary to provide for this side of

the conclusion then that made for teaching and since the new department is in connection departments of of applied is only one and that is particular the

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at Boston, and the College of Science and Technology in South Kensington, London.

To sum up the points already considered it is suggested that education and research in applied science (technical education) should be provided for in departments attached to such an institution as the Engineering College, and that industrial education should be provided for in trade schools established in the centres of the industries. Night schools do admirable work in the West, but it is difficult to obtain the services of efficient teachers. It is doubtful if teachers could be on duty by day and by night in India.

It may be added that the points which have been considered have received attention in organising the Indian Institute of Science. The Director hopes to receive students from Madras, and to work in co-operation with the new department of the Madras Government when it is established.

In conclusion certain other matters may be considered briefly: Observations on the methods of Indian workmen lead to the conclusion that they are not unwilling to learn the use of Western methods and appliances, but it is not of much use for industrial schools to teach the use of modern tools while it remains so extremely difficult to buy good European tools at a moderate price. Perhaps the new department find the means of inducing firms to send their travellers to the country as the Singer Sewing Machine Company have done, and to supply tools on reasonable terms. The fact that the a low standard of kind of work is inferior quality

Consider the connection between industry and the worker.

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pencils or glassware, and to neglect the natural resources of the country. On general economic grounds the working up of raw material which can be more readily obtained in India than elsewhere, both for export and for home consumption, should be of greater advantage to the country, than the manufacture of articles upon the sale of which European competition would leave but a small margin. At present enormous quantities of material used in the manufacture of drugs, essences, etc., are exported from India, and large quantities of the manufactured articles are reimported. The fibre-yielding materials of India have been by no means completely investigated. This list might be extended considerably. Of course there is no reason why such products as acids, alkali, and heavy chemicals generally should not be manufactured extensively in the country, as the freight alone is sufficient to protect the industry from competition.

With regard to the improvement of existing industries which flourish, but for which much might be done, the manufacture of pottery, oils, paints, tobacco, silk, should be considered at an early date.

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