

TECHNICAL EDUCATION AND THE CITY GUILDS.

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It is now generally recognised that the skill and education of our artisans is far below what it ought to be if British industries are to continue to compete successfully with those of foreign nations. Since the Great Exhibition of 1851, when our pride in English iron-work was somewhat humiliated by the display from other countries, there has been a growing fear that English manufacturers were losing ground, and recent events have only too well justified it. The girders for the new Tay Bridge are, it is said, being hammered now in Herr Krupp's factory at Essen, and it is not improbable that the raw material for these girders has been mined in Scotland, within fifty miles of where the bridge will be put up. Now it is clear that if the metal can be dug almost on the spot where it is going to be used, and

yet money can be saved by sending it all the way to Prussia to be forged and hammered, there must be some unprofitable ignorance and want of science on the part of our iron-makers. But iron is not the only ware it pays to manufacture out of England. The benzine which forms the basis of our aniline dyes is made in Paris out of raw material sent from home, and many other instances of the like needless traffic could be mentioned. Moreover, whole industries have left our shores, and markets which were once peculiarly our own have been transplanted to the Continent and the United States. The silk looms of Spitalfields are roaring now in Lyons, and the Clerkenwell watch may, it is threatened, give place to the American timepiece. Sewing machines, type-writers, telephones, and a thousand ingenious novelties useful in the household, which might have sprung from English heads and been shaped by English hands, are sent to us from the United States, and we are glad to get them at the price.

The cause of this unsatisfactory state of affairs, no doubt, lies partly in the onerous terms of the British Patent Law, which constitute a heavy tax on the brains of our inventors, and seriously handicap many a poor mechanical genius. In the United Kingdom a patent protecting an invention from piracy for the short space of three years can only be obtained for £25; in America it can be procured for £5, a sum which the ordinary artisan need have little difficulty in accumulating. Happily there are signs that the existing British terms for a patent will before long be considerably reduced. Nor is it likely that the Imperial Exchequer will suffer by the change, for the greater number of patents taken out will probably make up for the smaller fee.

There is, however, a cause for our industrial backwardness residing deeper than the regulations of the

Patent Law, and affecting not only the productiveness of the brain, but likewise the cunning of the fingers. Our artisans are, as a rule, ignorant of the scientific principles of their work, and being thus deprived of all intelligent interest in it, they become either careless or clumsy in the execution of it. The old system of seven years' apprenticeship taught a workman to know his art, if not very scientifically, at least by rote or "rule of thumb." But the invasion of steam-power and new machines has broken the old plan up, and there is yet no good substitute. At present a young apprentice is generally put into some corner of the workshop to tend a lathe, which goes on day after day, month after month, turning out screws, let us say, and the boy's duty is simply to look on and feed it. He is placed under the eye of some workman, almost as ignorant of general work as himself, or, at any rate, so busy with his own particular job that he has little time to teach the lad anything beyond his daily task. Thus the boy grows up a true "mechanic," not much better than the lathe itself from an industrial point of view. What positive interest, it may well be asked, can such a youth take in his business? A capable boy, with his heart in his work, wishes to know all its mysteries, if any one will tell him, and by a proper training even an indifferent apprentice can be brought to like his trade; but what chance was there for either under the old system?

The obvious and fundamental remedy for this state of matters is to educate the apprentice in the elements of natural science, and especially their application to the trade he follows, so that he may intelligently teach himself the methods and the meaning of his business. The principles of science are now so widely applied not only to the processes of manufacture, but to the tools used in the processes, that a knowledge of them is now essential to the artisan, if he is to remain a valuable servant. There could hardly be a more wasteful and short-sighted system than the present, for it allows the workman to degenerate into a piece of apparatus, and condemns his faculties of mind to stay unused.

The recent extraordinary demand for text-books of science and "technical educators" in this country is a proof that artisans naturally revolt from this mechanical bondage, and crave an intellectual knowledge of their work. They have taken in hand their own education, and by the help of these popular treatises many thousands have themselves acquired the information they desire. Properly interpreted, however, the movement indicates that the time is come when a great national organisation should undertake the technical education of the country, by colleges, schools, and classes, as well as regular examinations on the results of private study. Such a movement has at

* Messrs. Cassell, Petter, Galpin & Co. have sold over 200,000 copies of their "Technical Educator" since it was issued.

length been fairly started in the metropolis, and promises in time to spread its agencies throughout the whole country.

The Government has rightly charged itself with the duty of fostering elementary instruction in general science, by means of the Science and Art Department of South Kensington, and the benefits have already been considerable. It has, besides, remained for the City and Guilds of London Institute to see after the systematic technical education of the people; and it is not out of keeping that the wealthy corporations which were wont to guard the "arts and mysteries" of the ancient system should undertake the conduct of the new. The leading ways in which this could best be done were first suggested in a report to the General Committee of certain of the Livery Companies in 1878, and consisted in the foundation of a Central Institute for Technical Education, the establishment of Trade Schools in London and the provinces, technological examinations of private students, and grants of money to assist existing educational institutions.

Since then the principal Livery Companies and the Corporation of London have united into a great association for the furtherance of these objects. The Board of Governors consists of 146 members, drawn from the Corporation, and the Mercers', Drapers', Fishmongers', Goldsmiths', Salters', Ironmongers', Clothworkers', Dyers', Leathersellers', Pewterers', Armourers' and Braziers', Carpenters', Cordwainers', Coopers', Plasterers', and Needlemakers' Companies. At one time all the members of these civic guilds were masters of the particular craft they cherished; but it is so no longer, and it is nothing out of place to find a fashionable poet under the banner of the Fishmongers, or an astute lawyer amongst the Salters. In the Board of Governors there are many gentlemen of scientific tastes and culture, who must have the cause of technical education warmly at heart; moreover they will be assisted in their deliberations by experts from the learned societies, for it has, we understand, been decided to admit the Presidents of the Royal Society, the Institute of Civil Engineers, the Chemical Society, and the Chairman of the Council of the Society of Arts, as *ex-officio* members of the Board.

It was to be expected that, in founding a great system like this, considerable hesitancy and delay should occur from uncertainty as to the proper method of procedure, if from nothing else; but there appears to be no longer any question that the City Companies are fully alive to the national importance of the work they have begun, and earnestly determined to carry it out on a generous and successful scale. A fair commencement has been made, and a national scheme for the technical enlightenment of our artisans, tradesmen, and manufacturers will be realised ere many years have passed.

All the suggestions of the original report have been adopted; grants of money have been given to the Birkbeck Institution, the Society for Promoting the Employment of Women, and other institutions; Professorships in University College and King's College

have been endowed; the technological examinations which were formerly held under the auspices of the Society of Arts have been taken over, and the system extended and modified. Technical art and science classes have been started in London, and the preliminaries have been arranged for the erection of a Central Institute.

The technological examinations are carried out at any place where a class for instruction has been taught, and a "local committee" formed to undertake the examination. The subjects are very miscellaneous and comprehensive—for instance, alkali manufacture, practical blow-pipe analysis, brewing, cloth manufacture, wool-dyeing, electro-metallurgy, gas manufacture, lace, iron, and glass manufacture, photography, watch-making, tanning, telegraphy, paper-making, printing, &c. The examination is at present held yearly, and is divided into three grades, namely, Honours, Advanced, and Elementary. The first grade is chiefly intended for foremen over-lookers, the second for journeymen, and the third for apprentices; and first and second class certificates will be awarded in each grade. Any person desiring to be examined may present himself; but before he can take a Certificate in Technology he will be required to have passed the Science and Art Department Examination in certain Science subjects. This is, we think, a wise regulation, in so far as it will compel students to previously prepare themselves for the Technological examination by passing the South Kensington one, and thus tend to make the passage from the Board school onward more complete; but, on the other hand, it will probably debar a great many adult artisans from attempting the Technological examinations at all, because they have not previously gained the Science and Art certificate. Grants to teachers will be given by the City Guilds on the results of the examination, after the fashion of the South Kensington Department, and prizes of money, accompanied by medals, will be awarded to successful pupils. Full particulars of these arrangements are given in the official Programme of the City and Guilds Technological Examinations for 1880. During the year as many as fifty-six classes were established at thirty-eight centres, and over 1,300 students were examined. At present there is a great lack of duly-qualified teachers to conduct the classes, but it is hoped that this deficiency will be supplied by the high-class training which will be available in future at the Central Institute.

The cause of Art has been promoted by the City Guilds in establishing additional classes at the Lambeth Art School. Special instruction in wood-cutting, and other artistic occupation suitable to females, is given there to women. At the same school there are also classes where both male and female students are taught modelling in plaster, pottery, and silver, casting in bronze, fine art sculpture, cameo-cutting, and so on. A far more important advance has, however, been the establishment of Technical Science classes at the Middle Class Corporation Schools in Cowper Street, Finsbury. These classes are designed for the express purpose of teaching the application of physical

science to the arts and industries by means of actual apparatus, experiment, and direct observation. They constitute the pioneer of a great number of similar technical schools to be founded not only in different parts of London and its suburbs, but in all the large provincial towns.

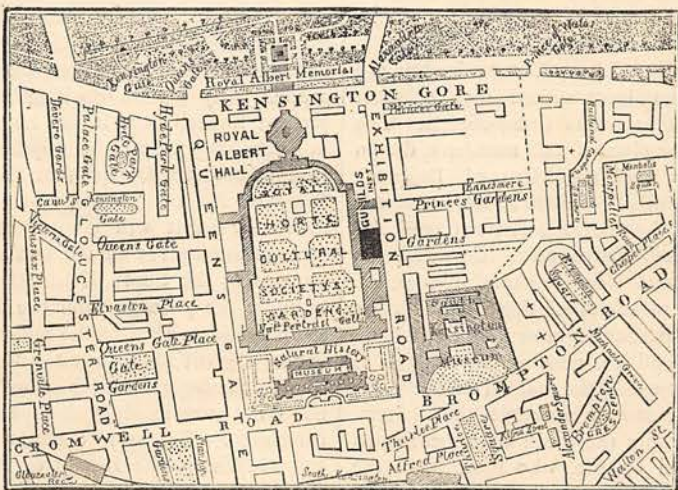
In November, 1879, two courses of lectures with laboratory practice were begun at Cowper Street. One course was dedicated to applied physics and mechanics, and was conducted by Professor W. E. Ayton, late of the Japan Imperial Engineering College; the other course treated of applied chemistry, and was directed by Professor Armstrong. Over a hundred artisans joined these classes, which were held in the evening, notwithstanding the relatively high fee of five shillings for each course. Latterly the City and Guilds have reduced the evening class rates to half this amount, and the result has been a considerable increase in the number of students. These evening classes were continued after the new year, and day classes were established in May to meet the opportunities of persons already engaged or intending to engage in the manufacturing industries. The object of these day classes is to afford such preliminary training as is necessary for those who may

desire, later on, to study particular branches of applied chemistry or physics, for which special accommodation will be provided in new buildings to be erected in the playground behind the schools. The students at the evening classes are of very diverse occupations: some are bankers, builders, Civil Service clerks, druggists, brush-makers, carpenters, watch-makers; others are photographers, teachers, pianoforte-makers, telegraph engineers, and fire-hose makers. They have manifested a great deal of interest in the lectures, and the classes must be considered a success. The day classes are more especially adapted to youths who have left the primary schools, but have not yet begun to learn their trade or business, than to artisans at work all day. When they have passed through these preliminary courses with laboratory practice, they may either be apprenticed to their trade, and thenceforward attend the evening courses, or they may pursue their theoretical grounding still further by attending the special courses of instruction on particular industries, to be given later on in the laboratories which are about to be erected. These day and evening classes (with

associated laboratory work) will be carried on during May, June, and July, October, November, and December of each year, and there will also be special tutorial courses in electrical engineering and photographic chemistry. At the close of every session, a professor's certificate and prize are awarded to the student showing highest merit in each class and laboratory course. The fees are very low, comparatively speaking, for all the courses, and it is satisfactory to learn that between three and four hundred students took advantage of the summer courses.

To provide for the extension of these technical classes at Cowper Street, the basement floor and lecture theatre of the schools have been leased, and ground secured in the area behind for the sites of new physical and chemical laboratories. It is also proposed to build a special laboratory for the study

of applied mechanics, and doubtless other sciences will in time be taught. The proposed Central Institute or Technical College for the education of teachers in the technical schools to be established throughout the country, and also for the sons of merchants and manufacturers, as well as the more promising artisans, is also in process of realisation. The negotiations for a building site



MAP SHOWING SITE FOR THE NEW TECHNICAL INSTITUTE.

are, we believe, settled, and the proposals of the Commissioners of the Exhibition of 1851, offering land for this purpose in Exhibition Road, between the South Kensington Museum and the new Natural History Museum, have been accepted, although the attached condition of purchase, to the effect that the presidents of the learned societies before enumerated should sit *ex officio* at the governing board, was not at first entirely acceptable to the liverymen. The sum required to build, fit, and furnish the contemplated edifice is estimated at £100,000 in the first place, and there is no doubt that the City Guilds see their way to raising it amongst them, with the help of the Corporation.

The City and Guilds' Institute has completed its preparatory stage by being constituted a corporation; and the committee of Gresham College in the City have liberally granted rooms and offices to the board for the transaction of their business. Thus, after the lapse of 200 years, the halls of the munificent Sir Thomas Gresham are once more witnessing the deliberations of a council intent upon diffusing natural science among the toiling masses of the City of London.