employed a few apprentices who assisted him in his work, and who learnt from him to understand the details of their craft, so that, when the term of their apprenticeship was over, they were competent to practise as journeymen. But now the master frequently has neither time nor opportunity to instruct young lads, and the old relation of master and apprentice is changed into that of manufacturer and workman. In conse­quence of these altered relations between employer and em­ployed, there has arisen an acknowledged want of properly trained workmen in a number of trades in which skilful hand work is still needed; and in these trades a demand has arisen for technical schools, or some other substitute for what was formerly done by apprenticeship, as a means of suitably train­ing workmen and foremen. The ever-increasing competition in production has led to the employment, in many trades, of children to do work of a mechanical kind requiring little skill; but, whilst thus employed, these young people have little oppor­tunity of learning those parts of their trade in which skill and special knowledge are needed; and when they are grown up, and seek higher wages, they are dismissed to make room for other children. Numbers of young people are thus thrown upon the labour market, swelling the percentage of the un­employed, who are competent to do nothing more than children’s work, and to earn children’s wages, and who know no trade to which they can apply their hands. To remedy this, by creating some substitute for the old apprenticeship, is one of the objects of a system of technical education; though in suitable trades an independent movement for reviving ap­prenticeship *(q.v.)* under improved conditions has also made some way.

A complete system of technical education should provide the necessary instruction for the different classes of persons engaged in productive industry. It is usual to divide these persons into three classes:—(r) workmen or journeymen; (2) foremen or overseers; (3) managers or masters.

The industries in which they are employed may be grouped under four heads:—(1) those involving the use of extensive machinery, such as iron and steel manufacture, machine-making, the textile industries, and some of the chemical trades; (2) those which mainly require the use of hand tools, as cabinet-making, brick-work, plumbing, and tailoring; (3) those depending on artistic skill, as wood and stone carving, metal-chasing, enamelling, de­corative work, and industrial designing generally; (4) agri­culture in all its branches, and forestry. These industries will be referred to as manufactures, handicrafts, art industries and agriculture. The foregoing classification comprises groups which necessarily, to some extent, overlap one another. Every factory contains a carpenter’s and smith’s shop, and handi­craftsmen of group (2) are required in every manufacturing concern. Whilst the industries in which hand labour is ex­clusively employed are becoming fewer and fewer, there are many trades which, owing to the frequent invention of labour- saving appliances, are passing gradually from the class of handicrafts to that of manufactures. In these trades, of which watch- and clock-making and boot- and shoe-making may be taken as examples, there is still a demand for goods largely if not entirely produced by hand work. In such trades, owing to the absence of facilities for instruction in the ordinary shops, there is a want of skilled hand labour which there is an increasing difficulty in satisfying, and to supply this want technical schools of different kinds have been established. Then, again, there are many branches of manufacturing in­dustry which greatly depend for their success upon the de­signer’s art, and it is necessary that the industrial designer should possess a knowledge of the processes of the manufacture in which his designs will be utilized, as well as of the properties and capabilities of the material to which they will be applied. Indeed, it is the possession of this knowledge which mainly distinguishes the industrial designer from the ordinary artist. To determine the best training for such designers is one of the problems of technical education. There are many trades, too, in which the handicraftsman and the designer should be united. This is the case in such industries as silversmith’s and goldsmith’s work. In these and other trades the true artisan is the artist and handicraftsman combined.

In order to reconcile some of the different views which are held as to the objects of technical education, it is necessary to keep in mind the broad distinction, above referred to, between the conditions of production on a large scale, as in those industries in which goods are manufac­tured by the use of extensive labour-saving machinery, and in those trades in which hand work is chiefly employed. Much of the diversity of opinion regarding the objects of tech­nical education is due to the difference of standpoint from which the problem is regarded. The volume of the trade and commerce of Britain depends mainly on the progress of its manufacturing industries. It is these which chiefly affect the exports and im­ports. The aim of manufacturers is to produce cheaper and better goods than can be produced by other manufacturers at home or abroad; and technical education is valuable to them, in so far as it enables them to do so. It also helps to widen the area of productive industry, and to encourage varieties of activity which the free and unfettered conditions of competition tend un­duly to restrict. On the other hand, the artisan engaged in hand industries looks to technical education for self-improvement, and for the means of acquiring that general knowledge of the principles and practice of his trade, which he is unable to obtain in the commercial shop. Hence the artisan and the manu­facturer approach the consideration of the question from different sides. To the spinner or weaver who almost ex­clusively employs women to tend his machinery, or to the manufacturing chemist whose workpeople are little more than labourers employed in carrying to and fro materials, knowing little or nothing of the scientific principles underlying the com­plicated processes in which they are engaged, the technical education of the workpeople may seem to be a matter of little moment. What such manufacturers require are the services of a few skilled engineers, artistic designers or scientific chemists. From the manufacturer’s point of view, therefore, technical instruction is not so much needed for the *hands* he employs in his work as for the *heads* that direct it. But in trades in which machinery plays a subsidiary part, technical teaching supplies the place of that instruction which, in former times, the master gave to his apprentice, and the workman is encouraged to attend technical classes with a view to acquiring that know­ledge of the theory and practice of his trade, on the acquisition of which his individual success greatly depends. In the former class of industries, technical education is needed mainly for the training of managers; in the latter, for the training of workmen. Hence has arisen a double cry,—for the teaching of art and of the higher branches of science, with a view to their application to manufacturing industry, and for the specialized instruction in drawing, and in the scientific facts which help to explain the processes and methods connected with the practice of different crafts and trades. This double cry has led to the establishment of technical universities and of trade schools.

Owing to the conditions under which manufacturing industry is now carried on, it is difficult to select competent foremen from the rank and file of the workmen. The ordinary hands gain a very limited and circumscribed ac­quaintance with the details of the manufacture in which they are engaged, and have little opportunity of acquiring that general knowledge of various departments of work, and of the structure and uses of the machinery em­ployed, which is essential to the foreman or overseer. It is in evening technical classes that this supplementary instruction, which it is the workman’s interest to acquire and the master’s to encourage, can be obtained; and it is from the more in­telligent workmen who attend these classes that masters and employers will select as foremen those students who are found to possess the essential qualifications. The history of invention shows how frequently important improvements in machinery