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 looks to it to supply him with the knowledge of the principles 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 teaching of trades, and of the scientific facts which help to explain the processes and methods con­nected with the practice of these 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 of the machinery in use, 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. The history of invention shows how frequently important improvements in machinery are made by the workman or minder in charge of it, and adds weight to the arguments already adduced for giving technical instruction to persons of all grades employed in manufacturing industry. To these advantages of technical education, as affecting the work­men themselves as well as the progress of the industry in which they are engaged, must be added the general im­provement in the character of the work produced, resulting from the superior and better-trained intelligence of those who have had the benefit of such instruction.

In order that the different classes of persons who are to be engaged in productive industry may receive a fitting preparatory training, the programme of elementary and secondary as well as of the higher education must be organized with reference to their special requirements. If the demand for technical instruction is to be fully satisfied, a great part of our existing system of education must be reconstructed, and the training provided in our several schools must be made a more fitting preparation for indus­trial work than it is at present.

Schools in which the course of instruction is not special­ized with a view to any particular industry, but is so arranged as to form a general preparation for manufac­turing or other trade pursuits, are often spoken of as professional, technical, or trade schools ; but such schools must be distinguished from apprenticeship schools, the object of which is to teach trades. Of the former class of schools there are excellent examples in the different countries of Europe as well as in the United States, and some few have recently been established in the United Kingdom. Of the latter class the best examples are found in France and Austria. The study of these schools, and of the means of providing fitting education for the different classes of producers, may be simplified by a state­ment of the following propositions :—

1. The ordinary education of all persons who are likely to be engaged in productive industry should be determined by the general requirements of their future work. This proposition affects the curriculum of all schools in which different classes of producers are to be trained, *i.e.,* of primary, secondary, and higher schools, and involves the consideration of the extent to which, in such schools, modern languages, science, drawing, and manual instruc­tion should take the place of literary and classical studies.
2. Special schools or classes should be established (*a*) for instruction in art, and in those sciences which serve to explain the processes of productive industry, including agriculture, manufactures, and engineering; (*b*) for instruction in the application of art and science to these depart­ments of industry; and (c) for the teaching of, and in certain cases for practice in, various handicrafts or trades.
3. The special schools should be adapted to the require­ments of the different grades of workers, and to tho different kinds of work in which they are or are likely to be engaged.

A survey of the technical schools in different countries shows how these different requirements are met. Owing to the complexity of the problem, a complete or an ideal system of technical education is nowhere to be found. Schools have been established to meet local and present wants, and the greatest variety exists in the attempts that have been made to establish schools in accordance with the foregoing propositions.

1. *Workmen.—*Many attempts have been made to provide a substitute for apprenticeship, but hitherto with no great success. Two classes of workpeople have to be considered—(1) those engaged in manufacturing industries, and (2) those engaged in handicraft industries. The education of all classes of workpeople begins in the public elementary schools ; and, in view of the future occupa­tion of the children, it may be taken for granted that primary instruction should be practical, and should include drawing and elementary science, with some amount of manual training for boys, and with needlework, cookery, and domestic economy for girls. In nearly every country of Europe, and in the United States, primary instruction includes drawing, in addition to reading, writing, and reckoning. In England this is not yet the case, drawing being taught in very few schools outside of the jurisdiction of the London school board. In France, Belgium, Holland, and Sweden handicraft instruction is generally included in the cur­riculum of elementary schools. Rudimentary science is also taught in nearly all the primary schools of Europe. Modelling is taught both to boys and girls in many Continental schools ; and in Sweden “slojd,” or elementary woodwork, in which simple and useful articles are constructed with the fewest possible tools, is taught with considerable success to children of both sexes.

In Germany and Switzerland there exists an excellent system of evening continuation schools, known as *Fortbildungs-* or *Ergänz­ungs-Schulen,* in which the instruction of the children who leave school before fourteen, and of those who leave at that age, is con­tinued. In most of these schools drawing is taught with special reference to local industries. In England an attempt is being made to attract children to evening schools by means of recreative classes. These classes are intended to continue the child’s general education, and to supplement it by some amount of practical teaching between the time that he leaves the elementary school and is prepared to take advantage of evening technical instruction. The training of most workpeople, and of nearly all those who are engaged in manufacturing industry, consists of—(1) primary teach­ing in elementary schools ; (2) practice in the factory or shop ; (3) evening technical instruction.

In all the principal towns throughout Europe evening classes have been established for teaching drawing, painting, and design­ing, and the elements of science in their application to special industries. On the Continent these classes are mainly supported by the municipalities, by the chambers of commerce, by industrial or trade societies, by county boards, and in some cases by the fees of the pupils. They receive little or no support from the state. They are well attended by workpeople of all grades, who are en­couraged by their employers to profit by these opportunities of instruction. In England evening technical instruction is more systematically organized than in any other country. It is under the direction of the committee of the council of education known as the Science and Art Department, and of the City and Guilds of London Institute for the advancement of technical education, an institute founded and supported by the corporation and by a large