



THE JOURNAL OF EDUCATION

Devoted to Education, Literature, Science, and the Arts.

Volume XX.

Quebec, Province of Quebec, October, 1876.

No. 10.

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suits, we shall find drawing to be the most essential single element of such instruction in all its grades,—the lowest and the highest. The truth of this assertion any one can substantiate for himself, by personal inquiries among the more intelligent of the men and women engaged in the different industries, and by reading the official reports of the various commissioners who have been appointed from time to time during the last twenty-five years, by European governments, to investigate the subject of technical instruction. It is true that a knowledge of chemistry, for example, will be found more essential in some employments than a knowledge of drawing; yet when the different employments are taken as a whole, it will be at once seen that drawing must be conceded the first place in industrial or technical education. This might seem a reckless assertion, were it not fully sustained by the very extensive investigations which European governments have made, and whose results, having been published, may be read of all men.

THE COMPREHENSIVENESS OF DRAWING.

Neither architecture, sculpture, nor painting, can get on without drawing. For only one of these—painting—is color an absolute essential. Hence it is that architecture, sculpture, and painting are so frequently spoken of as the “arts of drawing.”

Under architecture may be grouped, so far as general principles of drawing are concerned, all kinds of construction, apart from building, as machinery, locomotives, ships, bridges, fortifications, etc. For a like reason, under sculpture may be grouped stone cutting for decorative purposes, wood-carving, varieties of metal-working, all ornament in relief, modeling for the purposes of pottery, glass manufactures, etc. And when color is employed for decorative purposes, as it must be upon a flat surface,—cloth, for instance, if to be decorated,—the color (except in case only an even tint is laid on) must conform to some pattern predetermined by drawing; and this, whether the color be applied in flat tints or according to the principles of chiaroscuro. Thus it happens that every object made by the hand of man, if its form is of any consequence, is indebted, with rare exceptions, to drawing, for its form, or its decoration, or for both.

Drawing as an Element of Advanced Industrial Education.

BY C. B. STETSON.

A paper read before the Technical Section of the National Teachers' Association, at Baltimore, July 13, 1876.

The demand for advanced industrial education, which has grown rapidly of late years, must continue to grow for years to come, in every department of human industry. This is evident from the general tendency of civilization, from the fact that brain is counting more and more, while brawn is counting for less and less, in nearly every kind of labor. The construction of buildings, of machinery, of ships, and of bridges, the working of mines and the cultivation of the soil, and all the better class of manufactures call for a liberal education of its kind, no less than do law, medicine, and theology. The call, it may be repeated, is already urgent for large numbers possessing what may be vaguely termed advanced industrial education. What is this? The present paper proposes to consider one of its chief elements.

INDUSTRIAL VALUE OF DRAWING.

Whether we consider the technical instruction required by men, or by women, for success in industrial pur-