MANUAL TRAINING

IN EDUCATION

Thomas Davis

— BY —

JAMES VILA BLAKE

In the application of thy principles thou must be like the pancratiast, not like the gladiator; for the gladiator lets fall the sword which he uses, and is killed; but the other always has his hand, and needs to do nothing else than use it.

MARCUS AURELIUS.

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Manual Training in Education.

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PREFACE.

The educational forces are changing front. One after another, the division commanders are discovering that the most direct and practicable route to the citadel of strong, independent manhood and to the high ground of good citizenship lies through the territories of modern life, modern science, modern activities and modern thought. The old route involved a flank movement and a long detour into the territory of the ancients, to the heights of classic culture, from which, as a base, the whole modern country was to be attacked. Educational critics for many generations have agreed in the opinion that the old plan of campaign was the only one that was safe and sure. The undoubted success of many such movements in the past gave color to such views, and every suggestion of a better and more direct road was met by the fact that nearly every successful general in history had marched by the old path. To be sure this was not strange, inasmuch as no fairly equipped forces had ever attempted the direct

road. Nevertheless, the feeling in favor of a change has been gaining ground.

On the one hand it has been urged that the ancient road lay through a dreary country, abounding in books and preserved symbols to be sure, but dry and sadly deficient in living things and opportunities for showing one's parts. It is said that a great majority of the troops on that long journey drop out of the ranks and straggle into the modern country in a very sorry condition, having never seen the heights of classic culture, or only in the dim distance. On the other hand, those who in defiance of all the traditions have dared to make the direct assault with such irregulars as could be got together, have reported the discovery of practicable routes, a most genial climate, an abundant supply of fresh food, and excellent opportunities for both deep strategy and practice at arms. Moreover, it is claimed by those who know something of both roads (and hence are qualified to speak on the subject) that the new road gives the best promise of gaining the high ground of independence and citizenship; and that from these points the capture of the heights of fine arts and culture will be more certain than ever. Hence the pulling down of old walls and the gradual change of front.

This military figure could be pushed much farther. I could have compared ancient and modern methods of warfare, their arms, their armors, their means of transportation, their camp equipage, and followers, and the objects of conquest,—but I prefer to let the reader carry out the figure for himself.

The tendency of thoughtful and observant people is well shown in this modest little volume of Mr. Blake's. He has here given the result of his own vigorous thinking on what he has observed in himself and in others. We were students together at Harvard, and through widely different personal experiences we have reached the common ground of a belief in the universal value of manual training as an element in a truly liberal education.

It will be seen that Mr. Blake takes high ground. He has no narrow motive, no mean estimate of the value of objective training. He knows the stimulating effect of seeing for one's self; he has felt the force of things as compared with descriptions of things; and he has tested the value of primitive judgment.

Mr. Blake does not agree, nor do I, with the school superintendent who claims that the sole object of school education is intellectual culture; that "to superadd a thorough preparation for the busi-

ness of life, is to cripple the school in its appropriate sphere."*

As to the meaning of a manual training school it is perhaps fitting for me to speak. I first suggested the name in 1879, when the St. Louis school was organized, having already had six years experience with tool instruction in the higher department of our polytechnic school. Our course of study and daily programme remain substantially as adopted in 1879.

I followed no model either in America or in Europe. I profited by our own experience since 1873; by the reports of the Russian technical schools as exhibited in Philadelphia in 1876; and by the admirable efforts in a similar direction made in Boston by President John D. Runkle. I think I can fairly claim that experience has justified the organization of this institution, under the name of the "Manual Training School."

* 'The sphere of the school is intellectual training. To add to the proper work of schools the whole of moral training, and then to superadd a thorough preparation for the business of life, is to cripple the school in its appropriate sphere, and to fail in the impossible labor thus to be assigned. That truth cannot be discovered, nor benevolence and Christianity flourish, without manual training, seems absurd. In the present advocacy of this training intellectual power is denied, except as it is derived through matter. This is the grossest materialism."—*Supt. A. P. Marble, of Worcester, Mass.*

I will define a manual training school by first telling what it is not.

1. It is not a "manual labor" school. A "manual labor" school, as the term has been used for many years in America, is a semi-charitable institution, where a boy may in part pay his way by his labor, while receiving an ordinary education. The labor comes in chiefly as a means of support, and only remotely, if at all, as a means of education. In such schools both the labor and the education are relatively of a low order.

2. It is not an "industrial school." In America an industrial school is generally a reform school. In Europe it is an establishment intended to foster a particular industry, and all the pupils are directly trained to become workmen or workwomen in that industry. In such a school, literary and scientific training plays but a small part as compared with the industrial features.

3. It is not a trade or an apprenticeship school. Boys attend the last named school for the purpose of learning a trade; the school may teach only one trade, or it may have several departments, and so teach several trades. In a trade school every boy learns one trade and only one, and then follows it. Instead of a daily allowance of less than two hours

in a shop, and five or six hours in study, recitation and drawing, it is generally just the other way. Instead of a broad training in the typical tools and processes of all the practical arts, with a view to general intelligence and the acquisition of power in the social organism, the aim is to make a successful artisan in a particular trade.

The object of a manual training school is to make men, not mechanics. It inculcates the thoughtful study and use of both books and tools. Its great object is education, moral, intellectual and physical; other objects are secondary.

That industrial results will surely follow its introduction I have not the least doubt, but they will take care of themselves. Just as a love for the beautiful follows a love for the true; and as the high arts cannot thrive except on the firm foundation of the low ones, so a higher and finer development of all industrial standards is sure to follow a rational study of the underlying principles and methods. Every object of attention put into the school-room should be put there for two reasons, one educational, the other economic. Training, culture, skill, comes first in importance; knowledge about persons, things, places, customs, tools, methods, comes second. It is only by securing both

objects that the pupil gains the great prize, which is power to deal successfully with the men, things and activities which surround him.

C. M. WOODWARD.

MANUAL TRAINING SCHOOL,
St. Louis, April 24, 1886.

I.

General Education.

The first aim of education is to make noble human beings; and this means complete persons, roundly developed, with all their faculties as much exercised, trained and enlarged as can be in their special occupations. A certain wise and instructive philosopher loves to dwell on the value of "whole thinking," that is to say, the action of the mind on all sides and aspects of a subject, walking all round it, as it were, instead of looking on it only from one view-point; for a one-point view of anything is the same as to see it in a flat projection, and consequently to some degree distorted or untrue. Now, what wholeness is to thinking, wholeness also is to the growth of mind, heart, soul and body; namely, true beauty; for beauty is symmetry and correctness, (which means holding true relations with all things and being in one's proper place in nature), and power (because whatever is in its own place and truly related to other things will exercise all the power that belongs to it). No matter how strong, flourishing, exuberant, a development may be, if all in one direction, the result is distortion, unsightliness, uselessness; as may be seen in trees on the

sea-coast whose branches all point and lean one way by reason of the fierce blasts from the ocean, so that they seem as if the limbs on one side had failed to grow; and the added verdure of the other side makes not the trees less ugly or grotesque. The half of a thing, whether it be of a man, of a thought, of a line in a poem, of an engine, or of a principle, is either delusive or worthless—unless it be that it serve a purpose by its destruction, as the half of a fruit or other edible which becomes useful by taking its place in the wholeness of some organism. But why add words and illustrations for so plain a thing as that the end of education is to make whole, large, noble men? Why, indeed, may not any one run who reads a command or announcement of nature written in letters so large before the mind? Yet true it is that this plain, common sense has not become the rule of institutions of learning, or of systems of education, or even of individual men, except a few of the wisest.

A wise man said: "Every one must elect at some time in his life—perhaps early—whether he will educate himself to be a broad, expanded human being, open on all sides to the countless winds of affairs, interests, principles, sympathies, humanities, or whether he will make of himself an acute special-

ist—a marvelous development of a particular skill. For myself," he added, "I cannot hesitate a moment. I wish to be as much as possible of what first and foremost I am, namely, a man."

II.

Special Education.

Education has a secondary purpose, namely, to make excellent, thorough, skilled and productive workmen in all branches of human service, whether in mechanics, agriculture, philosophy, poetry or arts. This special end of education has its special means and training. The age of universal knowledge, tritely to say, has passed; so completely, indeed, that it is difficult for imagination in the present stress, whirl and complication of the arts and sciences, the immense development, the daily strides in all industries and philosophies, to conceive a time when an industrious and able scholar could know everything to be known, or, at least, worth knowing. The only way to equip the mind for service in any department at present, is voluntarily to be ignorant of a thousand other things; and this requires so much resolution in large and gifted minds that sometimes such persons pass through life ineffective because they have not self-denial to endure the general ignorance necessary for the powerful exercise of a special function. To try to master all is to master none. "Some books," says Bacon, "are to be tasted, others are to be swallowed,

and some few are to be chewed and digested; that is, some books are only to be read in part, others to be read, but not curiously, and some few to be read wholly and with diligent attention." If the great philosopher were living now he would add that there are very many books and very many subjects not even to be tasted. The difficulty in education is to make a wise choice between hosts of ignorances, most of which we must submit to. What not to study or read is the decision that taxes wisdom and forethought; and on this decision turns our supply of great and finished workmen in all departments of knowledge and of art.

III.

That both General and Special Education are needful: that one must not interfere with the other: and that this leads to Manual Training in Education.

If it be plain that the first object of education is to make complete men, and yet that there is a second end, namely, to produce special laborers of particular skill and great power, though limited in scope, it follows that we must think how to prevent the second aim from interfering with the first. This brings into view the subject of manual training in education. Little as yet the training of the hand has been given a place in the school-house; but it belongs there; for the hand and the brain, the muscular and the nervous systems, the physical and the mental powers, stand so opposite to each other, though not opposed, are so different, yet each necessary, being the two great orders of faculty which make up the whole man, that to education of the hand, not indeed chiefly, yet fundamentally, we must look to obtain in one a more nobly grown human being and a skilled worker in a special art. For one mental exercise has something in it of all others, and one manual activity of all bodily motion. A poet will have something of the virtues of history,

philosophy, science, politics, economics even, perhaps of mathematics; a machinist will have *ex arte* something of the benefits of the manual motions of carpentry, cabinet-making, tin work, tanning, plumbing and many other crafts. But the physical powers of a poet may be a sheer waste, the delicacies of whose possible fruits he may not even dream of; and the mind of the hand-worker may go through life with hardly the experience of an abstract thought or generalization, which, Emerson says, is "the influx of divinity into the mind, hence the thrill which attends it."

Therefore, if we aim to combine the two great ends of education, namely, whole development and special skill, we should begin with the broad distinction between body and mind; in other words, let us head-train the hand-worker and hand-train the head-worker. Manual training and head-training together form the only whole education.

Edward Atkinson, in a report to a committee of the Massachusetts legislature in 1879, thus defines the end and purpose of school and shop conjoined, that is, of a school of mechanical arts:

> The work of the school is to develop the mind and to give the skill and comprehension of a thorough mechanic in connection with other studies

needed for a good common school education or in a higher course of professional study. The work in the shop is to teach the application of the theory and to train the hand, eye, muscle, and intellect to accuracy and readiness; to make the eye and hand competent instruments of the instructed mind; to aim to train mind and muscle together, so that in after life the most work shall be done with the least effort, the least waste, and in the most effective way.

IV.

That the two-fold Education is specially needful to the Hand-worker.

It is noticeable that all the social privileges, refined and agreeable conditions, very often ample remunerations, and many, if not most, of the greatest pleasures of life, consort already with the head-worker, whether eminent in literature or in commerce or in science. The hand has little to do in it. Knowledge of manufacture, and especially any manual capacity therein, may have little part in the preparation of a commission-dealer in the product. Good penmanship makes no poem. But the handicraftsman has vital need of the education of his mind. For where there is no mind, hand-worker and serf-worker mean the same. The handicraftsman must be a hand-worker and head-worker together to be better than a mimic of a few bodily motions. Herein is there not a great badge of distinction and honor for handicraft, that while the poet, the historian, the essayist, the orator may be a sloven and Hottentot with his hands, intelligence and effort of mind must go with a trained hand to attain the highest result in hand-work? This is plain enough in sculpture, painting, music. It is

the same in the building of an engine and in all transformations of material. But no honor can be worn without responsibility. As its peculiar demand of accompanying mind is a glory of handicraft, so the hand-worker ought specially to feel the call and the need to be an educated man. Wanted more and more every day, are not men who are "themselves almost a part of an automatic mechanism," "ignorant practicers in a small department of trade," as Edward Atkinson has it, but mechanics, true mechanics—a term of large meaning and of great dignity.

It is, perhaps, usual to lay stress on the value of manual training to those who work in other ways. This is true, and a point for stress; but the other side is equally important. Let the hand-workman be collegized (to coin a term) as well as the college man be hand-workmanized, that both may be college-bred, that is, trained in a *collegium* or collection of arts and of masters.

V.

That the Hand-worker needs the two fold Education Economically.

Manual training in education has a vast economical interest for the handicraftsman; for it will increase his power over his material and over himself. A general education, and especially a broad mechanical training aiming to lay the same foundation for a special trade that a general university course gives preliminary to a law school, art school, or scientific school—this will give an inestimable sense of independence to a workman. Such is the exact effect of joining manual training with education; for this does not mean to join this or that trade with a school, but general mechanical instruction. From an English report, republished in this country by our bureau of education, we take the following concerning the apprenticeship schools of France.

The trade instruction in the workshops is subdivided into two courses. In the first the pupils are taught the nature and conversion of materials. In the second they pass on to actual construction. The first or preparatory course is the same for all the pupils. They all go in rotation through the workshops for both wood and iron. One of the reporters on the schools says that "*this is done in order to give suppleness*

and certainty to the hand, and to enable them, when they have become workmen, to take up in case of need, at any rate for a time, a trade different from their ordinary one, and thus to gain a living in bad times." The choice of a trade takes place only at the commencement of the second course, which coincides with that of the second year, and it is only then that they begin to execute actual constructive work. No apprentice is allowed to commence any work, whether complete in itself or a part of a machine, without having previously made a sketch or a drawing of it to scale, so that the pupil must necessarily acquaint himself with its proportions and connections and understand fully the nature of what he is doing.

VI.

That the Hand-worker needs the two-fold Education Socially.

It is a common complaint that handicraftsmen are not admitted into the same social relations as men of letters, merchants, clerks or salesmen. Sometimes this is said to be owing to contempt for a laborious life; but I hope not, and it is far from proved. As a nation we are hard workers—too hard—and the merchant, and even the scholar, often toils more slavishly than any one in his employment. Probably the social distinction is one of education, nice perception and refinement in manners. Many a hand-worker earns as much as a clerk, or even a lawyer, and yet his home will not have the same atmosphere, nor be the abode of the same manners—a difference shown in the few books at hand, the poor pictures, the coarse food and the rude customs at table. This is not because the man has been using a hand-tool all day; but because, owing to many causes dating far back, there has been an obstinate lack of education, and, consequently, of outward delicacy and refinement. As fast as we obtain in the handicraftsman not only a handworker, but a hand-and-head-worker—a scientific manual laborer

—we shall escape from this injurious social distinction. But it will not be so much social feeling that will rise above it as the handicraftsman himself; for, after all, it is mind and refinement of soul that make gentlehood here. Snobbery goes not far.

VII.

That Hand-working is of great Dignity.

But it is to be said and enforced that hand-working is very dignified in itself. It would seem as if this need not be argued; and, indeed, it need not to the thoughtful, the well instructed, the self-respectful. Yet it is one point in which public opinion and social feeling need to be educated, although happily there are many and good signs that the tide is setting the right way. More and more esteem and valuation rise for skilled hand-workers over counter-tenders and hangers-on of the professions. More and more it will be held shameful and a confession of ignorance or of incompetency in young men to rush for clerkships and salesmen's places. A judge eminent on the bench of Massachusetts told me that if he were to begin life again he would not be a lawyer, but a mechanic, so high was his appreciation of the dignity of a skilled hand's command over material. We shall come by and by to the old Rabbinical enthusiasm for the dignity of hand-work, which these learned teachers enforced both by precept and example. They said: "Get your living by even skinning carcasses in the street, and do not

say, 'I am a priest, I am a great man; this work would not befit my dignity.'" "He who does not teach his son a trade teaches him—robbery." Rabbi Johannan (ben Zakkaj) usually went by the name of his trade, the shoemaker; Rabbi Isaac was called the blacksmith, Shammaj (contemporary of the great Hillel) was a carpenter and architect. He never disdained to carry with him his carpenter's rule, even when teaching in the great synagogue. Other rabbis were tailors, bakers, gritsmakers, leather dressers, oven setters, sandalmakers, potters, dyers, threadmakers, coopers; and indeed it was by these manual labors that they lived, for there were no paid teachers. "Famous teachers," says Delitsch, "not only carried the chairs on their shoulders to the college because all labor calling for physical exercise was held to be an honor, but a certain Pinehas was cutting stone when he (the stone mason) was informed of his election to the high priesthood. Rabbi Joseph turned a mill, Rabbi Shesheth dragged beams, highly praising this arduous exercise, and more than a hundred Rabbis, whom the Talmud mentions, were artisans and bore artisan names."

Deficient reverence for hand-work seems strange when one looks with due wonder and awe on the

human hand. As an implement to deal with materials, the hand is a structure so extraordinary for its flexibility, innumerable applications and countless varieties of motions, as to cause, if we look at it well, a religious awe. "The ancient philosopher, Anaxagoras," says Plutarch, "assigned the hand for the cause of all human knowledge and discretion." That old philosopher lacks not modern followers who say that whatever may be the delicacy, complexity and convolutions of the human brain, man, without his hand, would be but a brute. As regards arts which confer on life comfort, abundance and refinement, there is no doubt of the part the hand plays. The arts useful and fine, as has been said beautifully, "are literally *handed* down from generation to generation." Analogously, whoever considers the place, function and power of the thumb in the human hand will not wonder that it has given rise to the expression "to thumb," meaning to use constantly and industriously. The presence of skill in the hand is a spiritual fact, an amazing, inexplicable thing, an unseen presence like what we call life or soul or spirit in the body, and is something beyond all a poet's, saint's or prophet's power to praise. A scientific musician told me he had composed a piece of music which was re-

jected because he had written great spread chords which could be performed only by an immense hand like his own. A man with a large hand, he said, particularly an organist, who by the use of the pedals has become used to the effect of wide chords, has much difficulty in writing for a small hand; but he added that some small hands make up by amazing skill. He had heard a girl play large hand chords by *arpeggio* so exquisitely and rapidly as to have all but the effect of one simultaneous stroke of the fingers, indeed, hardly distinguishable; and, taking the little hand in his own afterward, it was a marvel how it could be the tool that had done such things. On the same score Huxley claims proudly the right to be called a handicraftsman. He writes:

Probably at this stage of our progress it may occur to many of you to think of the story of the cobbler and his last, and to say to yourselves, though you may be too polite to put the question openly to me: "What does the speaker know practically about this matter? What is his handicraft?" I think the question is a very proper one, and, unless I were prepared to answer it, I hope satisfactorily, I should have chosen some other theme. The fact is, I am, and have been any time these thirty years, a man who works with his hands—a handicraftsman. I do not say this in the broadly metaphorical sense

in which fine gentlemen, with all the delicacy of Agag about them, trip to the hustings about election time and protest that they, too, are workingmen. I really mean my words to be taken in their direct, literal, and straightforward sense. In fact, if the most nimble-fingered watchmaker among you will come to my workshop he may set me to put a watch together, and I will set him to dissect, say, a black beetle's nerves. I do not wish to vaunt, but I am inclined to think that I shall manage my job to his satisfaction sooner than he will do his piece of work to mine.

A thorough mechanic, who is also an inventor and an intelligent thinker in science, once stretched out his right hand before me and said: "Sir, that hand is worth $50,000! I mean that the skill in those fingers, invisible to you, will yield me as much *per annum* as $50,000 excellently invested." Could a greater and more admirable thing for independence, for manliness, for power over circumstances, be said by human being? One valuable quality, almost a touching fact, as if the kind Creator had endowed with a democratic scope this wonderful organ which relates man so intimately and so closely with materials, is the exceeding educableness of the hand, the certainty that almost any hand can be trained to admirable degrees of skill. This power, which has such dignity and utility, is open

to all, wherein it is different from poetry, music, or the like. Says Leland: "There is not one person living having the usual amount of brains and hands who cannot learn to design well in simple decorative drawing in a few weeks, or, in extreme cases, in a few months, if he or she will try to acquire it. There is not one person who can execute a simple design who cannot master one or more of the minor arts." From statistics of apprenticeship schools in Paris it appears "that the greater number of boys become engine-builders or patternmakers, the two trades which in Paris command the highest wages" —thus showing the great educableness of the hand and the unquestionable prevalence of the capacity for its superior degrees of skill. Yet the highest degrees seldom can be attained in one man's life. It is a striking tribute to the dignity of the hand, and also to the subtile results of mechanical training, that there is an inherited aptitude for manual work, and that previous training seems to have gone into the very fibers and blood of the body. Francis A. Walker said before the New England Manufacturers and Mechanic's Institute:

There is great virtue in the inherited industrial aptitudes and instincts of a population, and those aptitudes and instincts may be wonderfully special

and minute. You can no more make a first-class dyer or a first-class machinist in one generation than you can in one generation make a Cossack horseman or Tartar herdsman. In the highest industrial sense artisans are born, not made. The problem is not so much to train as to breed. Aside from transmitted aptitudes and instincts there is also great virtue in the inherited traditions and prescriptions which pertain to the body of workmen, where any occupation making large demands for nicety of perception and nicety of manipulation has been long pursued. Writers have been driven to explain the unapproachable excellence of the steel blades which have for centuries been made in the city of Toledo, by assuming some mysterious property in the water with which swords are tempered. It is not the baptism of the blade, but the baptism of the artisan, which works the miracle of peerless edge and perfect elasticity. It is the temper of the mind of the worker to which, in the first instance, is due the temper of the weapon he forges.

When such skill is attained in the hand, accompanied, as it always will be in its highest exercise, with judgment and knowledge, what end to its dignity, power and command? While explaining the forging of vast rotary shafts for steamships, then in the making, the superintendent of a shop said: "A single false blow might spoil the whole thing, a bit of dirt might make a flaw which would cost us thou-

sands of dollars for damages. It takes a good mechanic to boss such a job, and we have to pay him good wages,—$12.00 a day. He is the most important man in the shop."

Note is to be taken of the artistic value of handwork and the direct connection of the hand with æsthetic sensibility. There is now a revolution, or perhaps an education coming to pass in the public mind, which makes known and felt the distinction between the merely beautiful and a quality in the beauty which gives it also a title to be called artistic. On this whole subject we cannot do better than to refer to Mr. Leland's paper, published by the bureau of education, and to quote from it briefly:

Great stress may be laid on the fact that as the flower precedes the fruit, decorative art is developed in the race before it attains proficiency in the practical. Before men had good axes or knives or plows or saws they made jewelry and embroidery far superior in many respects to anything now produced anywhere. We can imitate the shield described by Homer, but the artist does not live who could design anything so elegant and original. There is an enormous and rapidly growing demand for hand-made objects. As education and culture progress people begin to find out that in jewelry, as in pictures, or even in fire-irons, a thing to be truly artistic must be hand-made. It is not as yet generally under-

stood that machinery, though it may manufacture pretty things, cannot make them artistic. There are no such things as artistic works made in any way except by hand. Only the vulgar and ignorant confuse or confound that which is beautiful with what is artistic. Art does not consist entirely in prettiness, its best characteristic is the impression of individual character. This disappears in the machine, in fact, the more perfect machine work is, the less it is artistic. The faultlessly finished piece of silver work, such as no mere smith could ever rival, shows indeed the result of ingenuity, but not art. A Soudan bracelet made with a stone and a nail is far more artistic than a Connecticut mill-manufactured dollar bangle; yet the latter is infinitely the more "finished" of the two.

VIII.

That Manual Training in Education is Salutary in Morals.

The importance of the exercise and training of *the whole body* as a factor in morality is very great. This, indeed, is a subject too large for these pages. Besides, it is collateral, for my subject is the training of the hand. Yet the nice points in which the training of this one organ of the body affects morality are too many and too important for the limits of this little essay. Let it be noted chiefly that whatever benefits result morally from training and developing the whole body, spring even more delicately from the training of the hand; because not only must many muscles be exercised, and, indeed, the whole body be brought into play by manual occupation, so that all the advantages of physical activities are obtained, but the body is exerted in the most interesting manner for results which are useful in themselves beyond the exercise obtained in producing them, and in a way which calls the mental faculties into joint operation. Therefore, after we have enumerated all the general good and ethical results of bodily activity, such as the calming of the passions, the moral benefits of industry, avoid-

ance of the ills of idleness, protection from many forms of temptation and those often the worst, still we are far from doing justice to the moral benefits of a manual training which has produced a skillful, mobilized, useful and strong hand. It is a worthy and philosophic question how far and why hand culture must be joined with head culture to attain the highest moral condition and to erect the greatest moral safeguards. A hint of one answer may be found in Chap. I, where I have said that hand-training and head-training together make the only whole education. The ethical advantage of the union may be assumed; for no man can distort himself by exclusive attention to one order of faculties, and especially by neglecting to keep good balance between the two fundamental co-ordinates of his being—body and mind—without finding the distortion reporting itself in moral obtuseness and disorder. There are some classes of moral excellences in which the connection is immediately obvious; for example high ethical qualities difficult, perhaps impossible, in a condition of servitude. In these, everything that decreases a man's independence and conscious self-reliance tends to diminish his morality. Conversely, whatever increases a man's power over circumstances and builds up his self-

reliance, nourishes many noble qualities that depend thereon. Some of these are truthfulness, courage, generosity, philanthropy, and common honesty. The connection between independence and self-respect is very close, and again between self-respect and many moral qualities of great value. Therefore, these orders of morality are directly fortified by a training of the hand, which makes a man at home and powerful on the earth and amid materials, and lifts him above slavish helplessness in exigencies. Can any one enlarge the soul of his hand (bethinking ourselves of a philosophical doctrine that the soul occupies the whole body,—which at least has an important thought underneath it) and crystallize intelligence in that wondrous organ without becoming more of a man; and what is that but to say, a better man throughout? He may not be a good man then; but still worse he would be if his hand were clumsy and useless.

IX.

That Manual Training in Education is Salutary for the Mind.

Manual training in education is like a sponsor at the baptism of intelligence, so much will it undertake the good growth of mind. Knowledge is an obvious point in which manual training serves intellectual superiority. This needs but statement. Plainly it is not only a useful thing, but an accomlishment, an admirable power, to know fine work from sham, and hence to feel a thrill of admiration when excellence comes before us. And when we reflect on the many kinds of manual production, how sad to be ignorant of them all—of woodworking in all its departments, blacksmithing, metal working, the lathe, the plane, soldering, brazing, plumbing, painting, engraving, stonecutting, casting, and a hundred other notable activities of the hand. Even the knowledge and judgment of materials which hand-work gives is of itself a pleasure and a dignity.

But knowledge is only the tool or the material for the mind's work. Turn to the effects of manual training on intelligence. It is not easy to set too high the mental value of a trained hand (provided a

sound education join with manual training) or to do justice to the many subtile ways in which skill of hand ministers to acumen of mind. There is a curious ethnological argument on this point which I will quote from a scientific journal:

It is well known that, in its development, each new born being passes through very much the same stages that his ancestors have been through before him. Even after birth the growth of the child's intelligence simulates the progress of the human race from the savage condition to that of civilization. It has been shown by Preyer, and others, who have studied infant development, that a faculty which has been acquired by the race at a late stage is late in making its appearance in the child. Now, reading and writing are arts of comparatively recent achievement. Savage man could reap and sow, and weave, and build houses long before he could communicate his thoughts to a person at a distance by means of written speech. There is, then, reason to believe that a child's general intelligence would be best trained by making him skillful in many kinds of manual labor before beginning to torture him with letters; and the moral to be derived is, that primary instruction should be instruction in manual dexterity, and that reading and writing could be learned with pleasure and with ease by a child who had been fitted for taking them up by the right kind of preparation. The argument is a novel one, and it certainly seems plausible.

This argument is not to be passed by because somewhat it has the aspect of a curious speculation. Marvelousness and fact go hand in hand in creation, and in no subjects more plainly than in the relations of mind to body. If we consider the vast influence on the mind of a quickened observation, and how primary is observation in acquiring knowledge, we shall be at no loss to reason that the development of the senses, touch included, and the training of the hand in artisanship, must be a root of the growth of mind. This, plain in theory, is supported by direct testimony. In a report by Professor Ordway to the Massachusetts Institute of Technology on industrial education is the following relating to hand-work schools in Sweden:

Many are united with the public schools, so that hand-work and head-work are carried on under the same management; and it is generally found that when four or six hours a week are devoted to hand-work, the other studies suffer no detriment, but are pursued with the greater zeal.

Another writer, speaking of a carpentry shop connected with the Dwight School in Boston says:

It is said that boys who work in this shop a few hours each week do not fall behind the others in scholarship, and all that they learn in the trade is clear gain.

In Leland's paper on "Industrial Art in Schools," published by the bureau of education, I find:

It is gradually or rapidly being realized that children can, while at school, profitably practice decorative arts. It is also quite as true that this practice, far from interfering with the regular studies, actually aids and stimulates them. While the minor arts, guided by a knowledge of decorative design, are so easy as to be regarded by all children as a recreation, they are at the same time of practical value in training the eye and hand and awakening quickness of perception. There have come under my observation a great number of instances in which children who have been regarded as dull in everything have shown great aptness and ingenuity in designing, modeling or carving. When this skill is awakened there comes with it far greater cleverness in those studies or pursuits in which the pupil was previously slow. I believe it to be a great truth, as yet too little studied, that sluggish minds may be made active, even by merely mechanical exercises. This holds good as regards the practice of the minor arts by children. It is somewhat remarkable that, while every one is quick to observe mental ability or activity when transmitted from progenitors, very few notice the innumerable instances in which it is developed by education or circumstances. It is not a matter of theory, but of fact and observation, that all children who practice decorative arts are thereby improved both mentally and morally. The consciousness of being able to

make something well which will sell gives them proper pride and confidence in their ability to master other studies. It also conduces to quiet habits and content.

Opportunity and incentive to join theory and practice are important. We are not likely to wish, or to strive at the expense of much labor, to understand the explanation of things which we care nothing about doing. This thirst for knowledge belongs only to scientific minds. But who, if opportunity be at his door, will not wish and work to understand the laws, the relations, the causes, in short, the theory or science of arts which he is continually practicing? Even to one of pure scientific impulse for theory, practice and observation intensify, brighten, direct and regulate theoretical studies.

Therefore, in general education, theory should be opened to the developing artisan, and manual practice to the rising student of science. But in this connection it is to be said and enforced especially that the manual training school, by reason of its twin objects, intellectual and mechanical, is becoming a necessity because of the minute and degrading sub-division of manufacturing labor. Edward Atkinson says: "I lately inspected a shop in which sewing machines were being made, where one cam was shown me which passed through sixty hands

before it was ready for its place in the sewing machine." On this point speaks another circular of our bureau of education.

Machinery is making men into machines at such a rate that humanity is becoming seriously alarmed at the inevitable result. The old apprentice had a chance to rise, since he learned a whole trade; the modern workman, who is kept at making the sixtieth part of a shoe, and at nothing else, by a master whom he never sees, is becoming a mere serf to capital. Even the industrial school, with its "practical" work, can do nothing against this onward and terrible march of utilitaria. It is in the teaching of art and of the superiority of hand-work in all that constitutes taste that the remedy will be found. By-and-by, when culture shall have advanced—as it will—there will be an adjustment of interests. Machinery will supply mere physical comforts. Man, and not machinery, will minister to taste and refinement.

This minute specialization has become nearly as great a difficulty in science as in mechanics, and the intellectual result is the same. A writer says:

Among scientific men themselves the increasing specialization of their employments—inevitable, as far as we see, for the present—has produced, and is likely to produce, most serious disadvantages. It is Mill, we think, and before him Comte, the French philosopher, who deplores the moral and social effect of this dispersion of effort, and the concentra-

tion of it on only minute fragments of the business of life. The interests of the whole, says the former, the bearings of things on the ends of the social union, are less and less present to the minds of men who have so contracted a sphere of activity. The insignificant details which form their whole occupation, the infinitely minute wheel they help to turn in the machinery of society, does not arouse or gratify any feeling of public spirit or unity with their fellow men. A man's mind is as fatally narrowed, and his feelings toward the great ends of humanity as miserably stunted, by giving all his thoughts to the classification of a few insects or the resolution of a few equations as to sharpening the points and putting on the heads of pins.

If we suppose a naturalist, not only drifting, after his general education, into such minute specialized labor, but trained just for that from the beginning and for no other, it is plain he would be unutterably narrow, mentally worthless, and but a shred or shadow of a man. Yet just so is the handworkman made at present.

There is another effect of manual occupation on mental habit, which perhaps is first in importance, namely, the constant and unavoidable demands which manual training makes on accuracy, and the consequent habit of minute, painstaking application, patience and exactness which is developed. The

man who will labor for weeks or months to make surface plates that fit the one on the other like a film of oil to either, or who must work a fitting true to the thousandth of an inch, or make an edge which is as near the material realization of a mathematical line as mortals can come, will not be likely, if his mind be directed to reasonings in economy, philosophy, morals or statecraft, to dismiss the points with carelessness, or satisfy himself with tricks of logic or with off-hand argument. He will run his thought as close logically on the subject as he runs his tool on material. Nature looks after the mechanic's thoroughness and takes him in hand to produce a splendid instance of that half mental, half moral excellence called precision; for by no other way will nature let any result come forth from the work. Examine the striking difference in this respect between an argument before a jury, an oration before the Senate, a sermon before a congregation, and a piece of finished mechanism. A forensic speech or a religious discussion may be a glaring outrage on facts of history and of science and on the principles of reasoning; yet they will serve their close-at-hand purpose just as well—that is to say, they will suit all the requirements of the client, the jury, the Senate, the church, which are the masters

in the work, and seldom ask exactness, either in thought or in fact. But what if a mechanic build a machine similarly, and for chiefly its effect on the ear or eye or fancy? Nature is a different mistress; she accepts no botchery of that sort. The machine refuses to work, which is the vengeance of Nature indignant with inaccuracy and bad mental habits. Accordingly, a hand-workman is driven to precision by the very nature of his occupation. A good workman is he who obeys that requirement and labors patiently, and at last successfully, for the attainment of an ideal precision. And this manual necessity has incalculable effect (especially if any superjacent education be added) to make good habits of thought. After conversing much, as my position and occupation have required me to do, with men of all classes and grades, I must own I have found no class, not scientific or college-bred men themselves, who have been more stimulating, helpful, and valuable in conversation than fine mechanics, because the exactitude and patience of their manual work has created in them a "habit of excellence" in all operations, whether reflective or executive.

X.

That Manual Training in Education is Salutary for the Body.

Health is an advantage accruing from manual training. This point needs no more than statement, since it is obvious that bodily exercise is in itself conducive to bodily vitality, and especially so when united with mental exercise. There is a peculiar healthfulness in mental and physical work conjoined, as a physician (Elam, in "A Physician's Problems") has taken pains to testify, averring that, when he wishes to strengthen a feeble child, he provides for due mental exercise as carefully as for physical. A striking testimony is found in a circular of the bureau of education, which gives an account of apprenticeship schools in France. In one of these the school hours are twelve in number, from 7 in the morning to 7 in the evening, with an intermission of two hours only for meals. The report says:

During the first two years six hours daily are spent in the workshop and four in the school. In the third year eight hours are spent in the workshop and two in the school, leaving in each case two hours for meals and recreations, the latter including three hours of gymnastic exercise per week. When we visited the school, unannounced, we found the lads

working steadily and looking strong and healthy. M. Greard, in his report of 1878, says that during the five preceding years not one of the boys had died.

XI.

That Manual Training is Beneficial to the Rich.

I come to the benefits to the community from manual training as a part of education. One advantage has opened which is to be hailed gladly. It is perhaps as important as any, and yet has taken observers so by surprise as even to create adverse criticism. I mean what I may call in general the *elevation of the rich*—that is, the lifting up of them from their adulation of mere possessions to appreciation of the greater dignity of skill and workmanship. There is a deep and serious import in George Eliot's phrase, "the perishing upper classes." Now, it is found happily that not only the poor, but the sons of rich men take eagerly to manual training schools. This has been criticised, as if these schools ought to be the special advantage of the needy. But this is to misunderstand their nature, and to overlook one of their greatest benefits to the community. Just so far as boys from the wealthier classes throng them will they be fulfilling one of the most important of their natural functions—namely, to glorify and dignify fine grades of hand-work. When I saw in a Pennsylvania steel foundry a

young man coarsely clad in overalls, smutty as to hands and face with a highly ethical (as I will call it) grime, and afterward met that same young fellow in a parlor, taking his place easily, with beautiful manners, in the circle to which ancestral wealth introduced him, I thought both ends of the spectacle honorable and delightful. There can be no healthier facts for this, or indeed any, country, than such; and whatever manual training school helps or reveals such a tendency, is an encouragement for the present and a boon for the future.

XII.

That Manual Training is Beneficial to the Poor.

A benefit to the commuuity is the elevation of the poor, a different uplifting, but no less real, though less ethical and noble, than that which manual training confers on the rich. I mean their elevation to the union of theory with practice, and also to a greater command of themselves and of their conditions. It is one of the great facts of this age that more than ever before the poor go to school. It is a grand fact that the classes are steadily diminishing or disappearing which have no ambition or no way to obtain more than a bare subsistence. But now that education is not merely for the socially elevated, but is charged with elevating socially all persons who will, we must fit the education to such condition as many classes now are in, that is, join manual training with theoretical studies and with literature, and thereby so educate as to show the inherent dignity of hand-work, while at the same time we improve it; for most of the pupils from these classes must get their bread with the things that can be seen and handled; and well is it for the world that it is so. A writer says happily

and wittily: "The old-fashioned system seems to have been meant to send its graduates straight to heaven, for it utterly ignored the possibility of their ever having to use their hands or feet."

XIII.

That Manual Training is Important for Girls.

An economic benefit, which also has much to do with moral interests, is the immense value that manual training, once thoroughly organized in education, will have for girls. Is it true that we are behind other nations in this particular? There are those who assert that "we have not yet given the American girl as good a chance to learn how to earn her living or to take care of a family as is enjoyed by her sisters in France or Sweden, or even Mexico." If this be true, the dangerous omission should receive instantly our attention, and reason enough there is to deem it of vital importance. Reform in this point will increase not only the mechanical and artistic productions of the community, but also its elevation in morals. "There is a class of young people," says a circular of the bureau of education, mostly females, who, having taken the first step in vice, linger awhile before taking the second, and then are rapidly and utterly degraded"—a solemn fact. Beyond its moral import, it affects profoundly the economic and physical interests of society. Think of the terrible risks and woes a community

undergoes, as well as economic loss, from "the ranks of the uneducated, or even so-called educated young women when by circumstances these are called to earn their own way in the world, and find their hands no equipment and no implements for the emergency."

XIV.

That Manual Training is Beneficial to Production.

Manual training in education surely will enhance the sum and quality of the manufactured products of the community. More and more this is seen. I quote an instructive passage from a "Circular of Information" of the bureau of education at Washington:

Education makes labor more skillful and more productive. This proposition is based on a wide comparison of intelligent and ignorant labor, and is sustained by such a multitude of observations that it is no longer questioned by any one familiar with the facts. In 1846, Horace Mann, then secretary of the board of education of Massachusetts, opened a correspondence with business men to ascertain the comparative productive value of educated and uneducated labor. The men addressed included manufacturers of all kinds—machinists, engineers, railroad contractors, officers in the army, etc.—men who had the means of determining the productiveness of labor by observing hundreds of persons working side by side, using the same tools and machinery, and working on the same material, and making the same fabrics. In many instances the productiveness of each operative could be weighed by the pound or measured by the yard. The in-

vestigation disclosed an astonishing superiority in productive power of the educated laborer as compared with the uneducated. "The hand," wrote Mr. Mann, "is found to be another hand when guided by an intelligent mind. Processes are performed not only more rapidly, but better, when faculties which have been exercised in early life furnish their assistance. In great establishments and among large bodies of laborers, where men pass by each other ascending or descending in their grades of labor just as easily and certainly as particles of water of different degrees of temperature glide by each other, there it is found to be an almost invariable rule that the educated laborer rises to a higher and higher point in the kinds of labor performed, and also in the wages received, while the ignorant sinks like dregs and is always found at the bottom."

In 1870 the National Commissioner of Education widened Mr. Mann's investigations, addressing his inquiries to business men in all parts of the country and to a few large employers in Great Britain. The result was a complete confirmation of Mr. Mann's conclusions.

The same lesson has been taught and enforced by the world's expositions. In 1851 the Queen of England sent forth a gracious invitation to the nations to send to her proud capital the best products of human skill. The world responded grandly, and the World's Fair at London was the greatest and richest collection of the works of art and artisanship on which the sun had ever shone. The

exhibition was divided into nearly one hundred departments, the jurors were appointed, the articles were patiently examined, and at last the verdict was given. Great Britain was awarded the palm of excellence in nearly all the grand departments of the exhibition. The announcement of this result lit up Birmingham, Manchester, Sheffield, and other manufacturing towns with bonfires, and filled England with general joy. She rejoiced in the belief that she was mistress of the industrial world. She saw her sails whitening every sea and heard the increasing hum of her factories and mills.

Sixteen years passed over Europe. Napoleon III., in imitation of Queen Victoria's example, invited the nations to send up to his imperial capital the choicest products of human industry. The world responded even more grandly than before. The Paris Exposition was divided, like its predecessor, into over ninety departments; the jurors were appointed, the articles examined and the verdict reached. Great Britain had excelled her competitors in but ten of all the departments. The announcement of the verdict produced consternation among the representatives of British industry. They met at the Hotel de Louvre, and the one absorbing inquiry was, "Why this defeat." The unexpected news crossed the channel, causing greater alarm than the threatened invasion by Napoleon I. This defeat awakened England to the startling fact that the industrial scepter was slipping from her hands; and, as a result, she saw her ships rotting in her

harbors and the hammer falling from the hand of her starving workmen. The disaster arrested public attention, and a searching and thorough investigation for its cause was made by a Parliamentary commission. The report made to Parliament in 1868 contains the testimony and the conclusion. Education had won the palm of excellence for her competitors. The conclusion is forcibly stated in the testimony of Mr. Edward Huth. "The workmen of other countries," he said, "have a far superior education to ours, many of whom have none whatever. Their productions show clearly that there is not a machine working a machine, but that brains sit at the loom, and intelligence stands at the spinning wheel."

The discovered cause indicated the remedy, and the report to Parliament was soon followed by the great education bill, which established a general system of elementary education throughout Great Britain. Technical schools have been multiplied, and science has claimed a larger place in the higher schools and universities. Great Britain has appealed to the schoolmaster to win back her pre-eminence in industry.

The extraordinary development in the present age of the means of communication and transportation makes plainer still the need of a wider spread of mechanical knowledge and power. The operation of steam and of the telegraph, well has it been said, means simply that competition has now

become world-wide, and that the day of local isolation of trades and industries is passed. Even now whatever is made well in California affects similar industry in St. Petersburg or Melbourne. So it will be more and more. To meet these conditions, any community that values industrial eminence, or even wealth and power, must spread wider and establish more deeply the knowledge of mechanics.

XV.

That Manual Training is Beneficial to Invention.

Scientific artisan training is important to invention. The most valuable inventions must come from the educated hand-worker. Why so noticeable heretofore that great and important inventions have sprung almost never from artisans in the trade, whose processes they improved? Plainly because the uneducated workman operates like a machine, performing certain habitual motions or functions, which, even if exhibiting peculiar skill, are not inspired by knowledge of the theory of his work. This will be changed by scientific and manual training joined in one education.

Says a circular of our bureau: "Industries made but comparatively slow progress while they were carried on by persons whose instruction was limited to apprenticeship. Gradually, and in more recent times, the idea has made its way that the progress of an industry depends especially upon the degree of instruction of those who exercise it." A trained mechanic, now a large dealer in machinery, said to me that one great benefit of the manual training school is to be that the skillful mechanic will be-

come able to tell what he knows, by which capacity, now often entirely absent, experience can be communicated and progress quickened.

XVI.

That Manual Training is Important in Relation to Immigration.

A problem with which we have to deal is the enormous immigration which presents in this country one of the most astonishing spectacles in history. An eminent scholar said to me recently that any community left to itself to increase according to the natural multiplication of the species, will be found generally able to solve its own problems with happy results; but when these problems are affected by immense hordes of foreign and uneducated, unskilled and sometimes half-pauperized immigrants, the problem becomes not only distressing but difficult and dangerous. Meantime, it seems certain that steadiness of character, independence, political power and mental worth will go with manual capacity and with genuine respect for handwork. Now, shall this great advantage be surrendered wholly to the foreign element? I heard a preacher say that we stood in no danger from our immigrants. "If," he said, "a lion eat an ox, the lion is in no danger of becoming an ox, but the ox becomes lion." True; but we cannot pulverize and

masticate our immigrants to that degree, or, too, with that rapidity. I wish not to keep foreign men underlings or leave them undeveloped; but I plead for the equal development, side by side with them, of American stock, by those qualities and kinds of education which confer independence of circumstances and a skillful control over matter. How can this be done but by the training of the hand as a part of education? And how can this be done but by manual training schools? For the disagreeableness of practical work in a manufacturing shop by reason of the inroads of our untutored foreign residents, and the consequent, albeit temporary, vulgarization of mechanical surroundings, has attracted foreboding attention. A very eminent physician said to me lately that he thought it one of the most distressing problems of the country, and saw no light in it and no way out of it. A document of our bureau of education remarks on this fact: "Immigration has filled nearly every department of common labor with workmen long subject to caste ideas and resulting social customs. The unpleasant conditions thus resulting have crowded out intelligent American labor." Here it is that the institution which is both a shop and a school comes to supply the pressing need; for here mind-training and hand-

training go on together, making elevating and beautiful influences.

XVII.

That Manual Training affects beneficially the problem of Apprenticeship.

A point of economic value which is of incalculable importance, is the power of the manual training school to cope with the present problem of trades' exclusiveness as to apprentices, and indeed with the general decay of the apprenticeship system from whatever causes. This decline would be serious enongh in itself in any community and at any time; but it is rendered more serious here by the problems connected with our immigration, by the present facilities of communication the world over, and by the immense labor necessary to turn to account our advantages of soil, climate and mineral wealth. This especial need for well ordered and skillful mechanical labor, says a circular of the bureau of education, "has been attended by a steady decline of the apprenticeship system which heretofore formed our trained artisans. It has become more and more evident that if this decline of apprentices is not made good by effective training, the American manufacturer will be at the mercy of the trained laborer of Europe." But, indeed, the

old world communities are feeling the same strain. Our bureau refers to a French official report as follows:

In consequence of the virtual abolition of apprenticeship in most trades, and owing to the specialization and subdivision of manufactures resulting from the introduction of machinery, the number of skillful and intelligent workmen in all branches of industry and art manufacture has decreased, and the standard of technical knowledge has been lowered. This, the French author considers, has been specially prejudicial to French manufactures, the distinguishing merit of which he believes to have consisted in originality of design. The vulgarization of manufactures has, in his opinion, given great facilities for piracy, especially on the part of foreigners. He believes that a remedy for these evils will be found in the establishment of apprenticeship schools, the object of which should be mainly not the creation of foremen, but the theoretical and practical education of workmen proper. In determining what should be the trades taught in schools founded and carried on at the cost of the municipality, he would confine them to what he calls "parent industries"—that is to say, those in which the processes to be taught are applicable to a large number of allied trades.

Here the real relief is indicated. No community need be at the mercy of mechanics who will not teach their art, for it can have a school which will

teach it better. Speaking of the founding of a school of mechanical arts in the Institute of Technology in Boston, Edward Atkinson says:

At the date of the Centennial Exhibition no such school existed; and our late president, Mr. John D. Runkle, there found in the Russian department examples of work done, and a statement of the method adopted in Russia, which seemed to meet a need that we had long felt. With much effort he succeeded in obtaining the requisite means, to which the Massachusetts Charitable Mechanic Association contributed a considerable sum in consideration of two scholarships, and established the school which I have attempted to describe to you. From the time he first described it to me, and before I had myself examined the Russian work in Philadelphia, I have never doubted for a moment that President Runkle had brought from the Centennial one of its most valuable lessons, and that he had had the sagacity to perceive that in this plan there was a substitute for the old method of apprenticeship more effective and better than that could ever have been.

Says another writer:

The apprentice in a shop is a hewer of wood and a drawer of water, the last and least important individual in the shop. In the manual training school on the contrary, the boy is the most important individual. He is the object for which the school exists. He is the material that is to be finished. Instead of being left to himself to pick up what

he can, competent and intelligent instructors devote themselves to his training. As an apprentice, the boy exists for the benefit of the shop. As a scholar in a manual training school, the shop exists for the benefit of the boy.

XVIII.

Facts as to the need of Manual Training.

As to the present condition of manual training in education, it is plain that we have it not; and some general facts, beside the foregoing statements, press home sadly, not to say shamefully, our need of it. The following anecdote from a scientific and mechanical journal may illustrate, and perhaps hardly over-state, the present condition:

A young man stepped into the office of the Indianapolis Rolling Mill not long since and asked for work. "What can you do?" asked the president. "I don't know," said the young man. "Have you a trade?" "No Sir." "Where did you come from?" "From Pennsylvania." "Are you a German?" "No sir; I am an American." "If you were a German, or an Irishman, or a Frenchman, I could set you to work, because you would know how to do something, but Americans don't know anything about practical business."

The crowds of people who seek work willing to do anything, jostling in a scramble to pick up any occupation, and the small number who have a dignified skill in general mechanics or in some special handicraft—these are the impressive, often distressing, facts which prove the incapacity of our present

education to cope with the needs of the time. An editor advertised for a clerk and instantly had 500 applications; a mechanic advertised for a skilled artisan, and had only five or six answers, and most of those too old. This state of things influences our public service disastrously, producing not only a mean and demoralizing scramble for office, but inefficiency and unfaithfulness in duty. Said a Collector of the Port of New York: "You can possibly appreciate my situation when you hear that I have received applications for the position of weigher from 840 persons; and yet there are only fifteen weighers to be appointed." Sometimes—so great is popular thoughtlessness on this point—this evil is ascribed to education itself. It is said we have over-educated the youth of the country so that the boy has become too fine for his father's trade, and manual work is despised. This is not over-education, but bad education. The foolish, unrepublican and inhumane shows of wealth, the selfishness of the cultivated classes, the influence of slavery in our history, which perhaps will not be out-grown for half a century yet; immigration, the disturbing influences of the rapid transportation by railroads, which have not yet slipped into their normal and necessary relations to the community; the magical

growth of great cities, especially in the west; idleness, laziness, intemperance, the evil effects of agitators either vicious or ignorant that affect idle crowds, and the general atmosphere of alteration, revolution and reconstruction filling the whole earth at present with an uncertain groping, or often wild clutching, after a new condition, which prove peculiarly misleading to the indolent,—all these facts sufficiently account for our uncomfortable situation in respect to skilled artisanship, without resorting to the foolish plea that we have over-educated our young blood. The converse is true, if we take a high view of education. We have under-educated them by failing to add that manual training which would confer on the community the economic advantage of high respect for hand-work, and on the pupil the dignity of skill and of independence. Consequently, we have made misshapen and distorted men—too much grown in one part, too little in another, mental hunchbacks and clubfeet; and no more than an army of deformed bodies could carry a nation through a war, can communities of minds misshapen by one-sided pressure, bring a country to the level of the industrial requirements of peace.

XIX.

Beginnings.—Present Schools.

Regarding attempts at manual training in education, but slight information can be given, because the subject is so new, the efforts so few, and the accessible reports of them necessarily meager. Two kinds of mechanical schools must be distinguished. One is a school devoted to preparation for a special trade; but this I pass by without notice, for though many such exist, they do not come properly within the scope of manual training as an instruction of the hand in due course of general education. The other kind is a school of manual operations of many different sorts, preferring no one trade to another, but seeking to develop skill of hand and knowledge of materials, and to add to this a scientific and literary education. These are the true manual training schools. Even in the old civilization of Europe comparatively little has been attempted and little progress made as yet in the creation of such schools. France has some such in Paris, Rheims, Lyons, Rouen and several other cities; and there are two kinds—a primary or elementary sort, giving quite general instruction, and a peculiar system of "apprentice-

ship schools," which, while supplying technical, scientific and literary instruction, aim "to form workmen as distinguished from foremen." Some such schools shape their manual training wholly for particular trades; others give a general training before the trade is chosen, and after that a special training for the trade. These apprenticeship schools are few in number, but there are many of the elementary kind. A circular of our bureau of education, quoting from an English report of 1882, says: "There were when we visited Paris twenty-three primary schools to which a workshop had been attached. Ten others were on the point of being opened, and preparations were being made for attaching workshops to twelve others." In another circular of 1884, our bureau says: "The French are now preparing for a great extent of hand-work in the schools of Paris, both for boys and girls, but it will take time to realize their ideas." From the same document we may learn of hand-work schools in Germany, Holland, Denmark, Sweden and Finland. Sweden has shown much vitality on this subject. The report says it has been found difficult to "keep up with the demand for teachers in the new system, and to provide for the rapidly spreading introduction of the hand-work element in the

common schools. Teachers' institutes are held for six weeks in the summer to give the ordinary teachers a chance to learn the wood-work art, that they may give instruction in hand-work in addition to their other teaching." In England "hand-work in schools and hand-work schools seem to have made little progress," but "there has been much agitation on the subject and some movement has begun."

The latest facts which I have been able to glean are in an excellent circular of information of our bureau of education, under date of Sept. 5th, 1885, being "a review of the reports of the British Royal Commissioners on Technical Instruction." The circular says: "It will be found that in every one of the old polytechnics [that is, scientific polytechnic schools] the notion prevails that if the brain be thoroughly trained, the hands will take care of themselves. This is the old view of higher technology." As a consequence there is an excess of polytechnic graduates over the demand. One manager of large engineering works put in his window the notice, "No polytechnic student need apply." The Austrian minister of instruction, says the circular, "told the writer that the most serious problem in education in that country is to reduce the number of theoretical engineers who, after their

long course of study, found themselves not wanted, and to increase the number of men in whose training theory and practice had been so combined that they could meet the great demand for those who can put theory and practice together." This on the manual side of the value of joint education. On the other, or intellectual side, is the following from the English report: "Your commissioners cannot repeat too often that they have been impressed with the general intelligence and technical knowledge of the masters and managers of industrial establishments on the continent. They have found that these persons as a rule possess a sound knowledge of the sciences upon which their industry depends. They are familiar with every new scientific discovery of importance and appreciate its applicability to their special industry. They adopt not only the inventions and improvements made in their own country, but also those of the world at large, thanks to their knowledge of foreign languages and of the conditions of manufacture prevalent elsewhere."

Russia has the honor of leading the world in manual training as a part of education. The circular says:

"The *new idea* which appears here and there among the technical schools is to incorporate shop-

work with the essential parts of the old courses. This has been done in three ways: (1) by mixing shopwork with the duties of each week, as at Moscow; (2) by consolidating the shopwork in a year following the school course, as at St. Petersburg; (3) by requiring a certain amount of shopwork as a condition of admission to the schoolwork, as at the Royal Foreman School of Chemnitz. The Russians alone among European nations are entitled to the credit of attempting to reform the technical training of engineers and mechanics by mixing workshop instruction with other elements of the polytechnic course. Their success is remarkable. * * * * Russia is the lee shore upon which the choicest educational pebbles may be gathered. In studying Russia one sees all European technological education epitomized, and the whole plan of the new education in Russia may be seen in the two schools of technology at St. Petersburg and Moscow. In each school is an ample, well equipped manufacturing machine shop where the students see good work done by skilled mechanics and are taught to do such themselves; the course of study is otherwise substantially the same as in the German polytechnics. In each shop a definite number of hours of work are required of every student, with this difference in the plan, that at Moscow the shopwork is *mixed with the duties of every week* of the six-year course; at St. Petersburg it is consolidated into a fifth year, after all the school work of the four-year course has been finished. At Moscow no week passes with-

out shopwork; at St. Petersburg no shop work is done till the beginning of the fifth year, which year is wholly devoted to drawing and shopwork. The two schools differ also in this, that at St. Petersburg all the students are externs, at Moscow about one-third are boarders. * * * * To give zest to the rather tedious work of the first three years the boys hear lectures on practical topics, such as the best cutting angle of files, the set of saw teeth, etc., which may not make them any better mechanics, yet tends to improve their general intelligence." The Royal Foremen's school at Chemnitz requires shopwork as a "preliminary condition of admission." It is designed to give mechinists, dyers, tanners, millers, and other machanics, a theoretical and scientific knowledge of their arts, and "the student must have worked at least two years at his calling before entering."

France continues her attention to the subject, and has many schools of two different classes, namely, the apprenticeship school in which particular trades are taught, and common schools, in which manual training in general is carried on with literary and scientific education. These are often under very rigorous discipline, the students sometimes wearing uniform, and being very closely held to work. The school day is sometimes twelve and three quarters hours long, divided about equally between the school room and the shop. Some of these

schools take children even as young as six years old, and give them three hours of instruction each week in handicraft. After ten years of age they work eighteen hours a week in the shop. The Royal commissioners say that "in affording an education in which theory is not carried too far and is duly combined with laboratory practice, and in some cases with workshop instruction, and in which, moreover, the scientific teaching is made to bear upon the principal manufacturers of the districts, these higher technical schools (a grade below the German polytechnics and the *École Centrale* of Paris) provide the kind of education that is best adapted to the various grades of managers of works."

As to English progress in this subject, the royal report, after expressing the view on the intellectual side, "that many workmen are disposed to attach too little value to the importance of acquiring a knowledge of the principles of science because they do not see their application," says on the practical or manual side, "Your commissioners have had the opportunity of inspecting the manual work of the pupils, both at the Manchester board schools and at the central school in Sheffield, and they are satisfied that such work is very beneficial as a part of the preliminary education of boys in this country

who are to be subsequently engaged in industrial pursuits, even though it should not, as however it probably will do, actually shorten the period of their apprenticeship."

As to Ireland, the commissioners say: "We need scarcely point out that, if it be deemed desirable to introduce manual instruction in the use of tools in elementary schools at all, this would apply in an eminent degree to the primary schools of Ireland. It was stated in evidence before us, that in some parts of Ireland ordinary handicrafts, like those of the mason, have become absolutely extinct. Whether the children remain in their own immediate localities or migrate to other parts of the country, or emigrate to our colonies or to foreign countries, such instruction leading up to their apprenticeship as skilled laborers, instead of their fulfilling, as is now too much the case, the part of mere hewers of wood and drawers of water, would be of the greatest value to them. We are happy to find that the authorities of the national board of education in Ireland appreciate the importance of introducing instruction in manual work into their schools."

How meager are these facts for a review of the condition of such a subject in the world; yet they

include all of much importance which our bureau of education has collected from foreign reports. As regards our own country, information at present is equally meager. In the report of our commissioner of education for 1882–'83, filling over 1,000 pages, but three or four are devoted to "progress of instruction in practical mechanics," and these pages mention only a course of shop practice in the Colorado Agricultural college, the Illinois Industrial university, Purdue university in Indiana, the College of Mechanical Arts at Cornell university, the Agricultural and Mechanical college of Texas, the Institute of Technology at Boston, and the Manual Training school of St. Louis. A circular of the bureau adds a brief history of experiments in Peru, Ill., Moline, Ill., New Haven, Conn., the school in Chicago, two experiments in Boston, a genuine apprenticeship school in New York city and a school in Baltimore. The latter has a special significance, for the circular remarks: "Baltimore is the first municipality to establish a manual training school as an integral part of the public school system."

The report of our commissioner for 1883–'84, just at hand (March, 1886), of over 1,200 pages, has but three pages devoted to manual training. These mention a school in Brookline, Mass., and add:

"So far as reported to this office, the cities in which provision for manual training has been made in connection with the public schools, or under the auspices of the public school boards are Boston, New Haven, Philadelphia, Baltimore, Cleveland, Toledo, Chicago, Moline and Peru." I know not why some of these cities should be credited thus. The subject has been broached in the school board of Chicago, but without action as yet. There is a school at Cleveland, but not a public school; it has the peculiarity of holding its sessions in the afternoons from 2:30 to 5:30 o'clock, and on Saturday mornings from 9 to 12 o'clock, so "that it may supplement," says its circular, "the present method of education," and "so arrange the exercises that the pupils of many of the existing schools may avail themselves of the instruction given in its classes." To the cities which have taken a forward step in providing for manual training in the public schools must be added Omaha.

A course in mechanic arts has just been opened in the State Agricultural school of Michigan, at Lansing. There is a school of mechanics, long established, at Worcester, Mass. Besides these I have met a reference, how authoritative I cannot say, to manual instruction at Girard college, in Philadel-

phia. A meager enumeration, not complete, no doubt, but, even if much multiplied, still a meager collection of facts on such a subject as the training of the hand viewed as a department of education. I have been able to visit no school but the one in Chicago. In that, there are six hours of school work daily except Saturday and Sunday. Of the six hours, two are give to shop-work, one to drawing, three to literary, mathematical and scientific studies, for three years. The mechanical instruction for the first year is in wood-working; the next year includes two months in foundry-work, and eight months in blacksmithing; in the third year, which completes the course, the mechanical work is in the machine shop.

[NOTE.—I learn from Prof. C. M. Woodward, Director of the Manual Training School at St. Louis, Mo., that in September, 1885, the Technical School at Manchester, England, was changed to a school of Manual Training, exactly on the plan of the St. Louis School, under guidance of two addresses delivered there by him in the previous spring: also that the St. Louis plan has been followed directly in the school at Baltimore (public), and in that at Chicago (private), and partially in public schools at Boston, New York, Philadelphia, Toledo, Eau Claire. Omaha, and in private schools at Cleveland and Denver.]

XX.

Manual Training in Public Schools.

Although some cities have entered actually on the experiment, still among educators it is an important question whether manual training should be introduced into our public schools. A discussion of this point will be found in a circular of our bureau of education, of 1881, entitled "The Relation of Education to Industrial and Technical Training in American Schools." The conclusions are adverse to industrial departments in the public school system. Another discussion, with similar conclusions, is to be found in a circular of the bureau, dated January, 1885. On the other hand, an English commission, after reviewing and citing French laws on the subject, thus sums up

It is clearly the aim of the government and of the great cities that this superior instruction shall be placed as fully as possible within the reach of the workingmen. The instruction in the use of tools during the elementary school age, besides being of service to every child, whether destined to become a mechanic or not, will tend, in the former case, to facilitate the learning of a trade, though it may not actually shorten the necessary period of apprentice-

ship. We should be glad to see this kind of manual instruction introduced into some of our own elementary schools. The consideration of the expediency of a grant from the education department for instruction of this kind may be well deferred for the present.

The subject was discussed at the meeting of the National Educational Association, at Madison, Wis., in July, 1884. The need of special schools of mechanic arts "was freely admitted;" but as to whether manual training should become a part of the public school system, views differed widely, but, says the report of the commissioner, with "a general agreement" against it. Prof. Woodward, director of the manual training school at St. Louis, said, "My advice is, go slowly. Do not mistake the shadow for the substance. Treat manual training with dignity and respect."

The following is a decided opinion from a special point of view; I take it from an article on the labor question:

Industrial education in manual training schools must be introduced into our system of public schools. At present our young people have no chance to learn a trade in a factory. They are employed at part work, so that it takes a team of seven men to make a boot and several hundred men to make a watch. The principles of mechanical employments are few,

and could be taught, together with other intellectual teaching, in the common schools. With a knowledge of these principles individuals could shift from one trade to another without being compelled to remain idle on account of their inability to work outside o their single trade.

Such divergent opinion, as well as the great importance of the subject and the paramount interest of all that touches education, show that the relation of the state to this subject—the question of manual training in our public schools—needs wide and careful discussion, particularly by experienced, thoughtful and learned educators. I will not offer a confident opinion; yet it is my conclusion that manual training ought to be incorporated radically with public education, and go hand in hand with mental training from the primary grades up to our high schools, or even to our university doors.