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CHANGES NEEDED IN AMERICAN
SECONDARY EDUCATION**

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CHANGES NEEDED IN AMERICAN SECONDARY EDUCATION

BY
CHARLES W. ELIOT

THE prevailing programmes in American secondary schools contain many valuable features. It is the purpose of this essay to set forth certain much-needed amendments of these programmes.

The best part of all human knowledge has come by exact and studied observation made through the senses of sight, hearing, taste, smell, and touch. The most important part of education has always been the training of the senses through which that best part of knowledge comes. This training has two precious results in the individual besides the faculty of accurate observation—one the acquisition of some sort of skill, the other the habit of careful reflection and measured reasoning which results in precise statement and record.

A baby spends all its waking time in learning to use its senses, and to reason correctly from the evidence of its senses. At first, it reaches after objects near by and far off alike, but gradually learns to judge by the eye whether or not it can reach the object seen. It tries to put everything into its mouth, perhaps in an effort to estimate size and shape correctly—which at first it cannot accomplish by the eye alone as the adult does, nor satisfactorily to itself even by the hand—or else to renew some of the agreeable sensations as to flavor or texture which it has already experienced,

or possibly to rub its gums against something which feels cool and smooth. The baby's assiduity in observation and experimentation, and the rapidity of its progress in sense-training are probably never matched in after life. Its mind is also trained fast; because it is constantly practising the mental interpretation of the phenomena which its senses present to it.

The boy on a farm has admirable opportunities to train eye, ear, and hand; because he can always be looking at the sky and the soils, the woods, the crops, and the forests, having familiar intercourse with many domestic animals, using various tools, listening to the innumerable sweet sounds which wind, water, birds, and insects make on the countryside, and in his holidays hunting, fishing, and roaming.

Increasing skill in the use of the hands and fingers has undoubtedly had much to do with the development of the human mind ever since man first stood erect, and set free from foot work his fingers and their opposing thumb. One of the best methods of developing the minds of children is practice in the coördinated activities of the brain and the hand. If brain, eye, and hand are cooperating, the developing mental effect is increased; and the mental action and reaction is stronger still when eyes, ears, and hands, and the whole nervous system, the memory, and the discriminating judgment are at work together.

The fundamental trades—such as those of the carpenter, mason, blacksmith, wheelwright, painter, hand leather-worker, and shoemaker, have provided immensely valuable education for the human race, and have, indeed, been the chief means of raising barbarous peoples to a condition of approximate civilization. To-day the teaching of those trades, without much use of machinery, is the best mode of developing the natural powers of a backward people—like the North American Indians and the negroes. When a Hindu father transmits to his son not only his caste with all its privileges and its restrictions, but also his hand-trade—such, for example, as that of a goldsmith or a potter, he imparts to his son under a religious sanction some of the most important elements in a sound education. East Indian civilization has been in great part transmitted in this way. The European guilds with their elaborate rules about apprenticeship contributed strongly for centuries to the education of the people through trades, before public schools

and education for the masses through books and reading had been thought of.

There have of course been civilizations which had but slight foundations, apart from military force, except a strong development of linguistic, philosophical, or theological studies; but even these civilizations have generally developed also to a high degree some fine art, like architecture, sculpture, or ceramic art, which requires keen observation and no little skill. Moreover, none of these civilizations were so firmly founded as our own; for they had not attained to the scientific conception of truth, or to the inductive method of arriving at truth. It should be the great advantage of modern education that it has learnt to combine the training of the powers of observation with an accurate use of language and the best kind of memory work.

In noble and rich families some training of the senses was obtained all through feudal times; because the men were brought up to war and the chase, and the women not only shared in some degree the sports of the men, but acquired the manual skill which sewing, knitting, hand-weaving, and embroidering demand. Even before the invention of gunpowder, success in war demanded the skilful use of trained senses in accurate and quick observation. Hunting and fishing have from the earliest times provided all sorts and conditions of men with admirable training of alert senses.

In respect to the training of their senses the children of well-to-do parents nowadays are often worse off than the children of the poor; because they are not called upon to perform services in the household or on the farm which give practice in accurate observation and manual dexterity.

The advent of mechanical power and machinery has greatly impaired the educational value of many trades; and this impairment has become so common that it may almost be called universal. The accurate joints a carpenter used to make by the careful use of his own eyes and hands are now made by machines almost without human intervention. The horseshoes which a blacksmith used to turn by hand on his anvil, and temper in his own little fire with an accurate appreciation of the changing tints of the hot metal, are now turned out by machinery by the hundred thousand, almost without touch of human hand or glance of human eye. Tending machinery is, as a rule, less instructive for the workman than hand-

work of the old-fashioned sort, unless, indeed, the machine is complex, and the product liable to imperfections. In that case the working of the machine must be closely watched by trained human senses. The ordinary uniformity of a machine product is due to invariability in the action of the machine; and this invariability is a main object from the point of view of the inventor or the proprietor; but that same invariability makes the tending of the machine of little use in the education of the human being that tends it—child, woman, or man. In certain industries a young man may learn in two or three days to make the few almost automatic movements which the right tending of his machine demands; and then may go on for years tending that same machine. Any ambitious or even prudent young man will try to escape as soon as possible from that sort of work. There is in it no training of the senses, no progress, and no joy in work.

The difference between a good workman and a poor one in farming, mining, or manufacturing is the difference between the man who possesses well-trained senses and good judgment in using them, and the man who does not. The valuable farm-hand is the man that can drive a straight furrow with a plough and a pair of mules, or can follow accurately in parallel curves the contours of the land while ploughing. The good hand-fisherman is the man who can feel correctly what is going on at the fishhook out of sight, and can make his motor nerves react quickly to what he feels there. The successful hunter is the man who can not only organize a well-devised drive, but can shoot surely the instant the game comes in sight. It is the blacksmith who has the sure touch with his hammer and the quick sight of the right tint on the heated drills who can sharpen three sets of quarryman's drills, while another man sharpens one.

It follows from these considerations that the training of the senses should always have been a prime object in human education at every stage from primary to professional. That prime object it has never been, and is not to-day. The kind of education the modern world has inherited from ancient times was based chiefly on literature. Its principal materials, besides some elementary mathematics, were sacred and profane writings, both prose and poetry, including descriptive narration, history, philosophy, and

religion; but accompanying this tradition of language and literature was another highly useful transmission from ancient times—the study of the Fine Arts, with the many kinds of skill that are indispensable to artistic creation. Wherever in Europe the cultivation of the Fine Arts has survived in vigor, there the varied skill of the artist in music, painting, sculpture, and architecture has been a saving element in national education, although it affected strongly only a limited number of persons. The English nation was less influenced by artistic culture than the nations of the continent. American secondary and higher education copied English models, and were also injuriously affected by the Puritan, Genevan, Scotch-Presbyterian, and Quaker disdain for the Fine Arts. As a result the programmes of secondary schools in the United States allotted only an insignificant portion of school time to the cultivation of the perceptive power through music and drawing; and, until lately, boys and girls in secondary schools did not have their attention directed to the Fine Arts by any outside or voluntary organizations. As a rule, the young men admitted to American colleges can neither draw nor sing; and they possess no other skill of eye, ear, or hand. A high degree of skill in athletic sports is acquired only by exceptional persons; and the skill itself is of a coarser kind than that needed by the artist and the skilled workman.

Since the middle of the eighteenth century a new element in the education of the white race has been developing, slowly for a hundred years but rapidly during the past fifty. This new element is physical, chemical, and biological science. Through the study of these subjects the medical profession has been revolutionized and several new professions of high value have been created—such as that of the chemist, of the engineer—civil, mechanical, electrical, or metallurgical—and of the forester. Through the radical work of great inventors and discoverers and of these new professions, all the large industries and transportation methods of the world, and therefore the commerce of the world, have been so changed that the producers and traders of times preceding 1850 would find, if they should revisit the scenes of their labors, that the processes by which they made their livings or their fortunes had completely disappeared. This prodigious change should have instructed the makers of programmes for schools and colleges maintained by