A STUDY OF CALVIN MILTON WOODWARD'S CONTRIBUTIONS TO THE PRESENT-DAY FIELD OF INDUSTRIAL ARTS

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CHAPTER I

INTRODUCTION

During the last few years thousands of people have read the inscription, "The Manual Training School," which is imbedded in stone over the doorway of an old warehouse near the Union Station in St. Louis, but relatively few have realized its significance. This inscription is one of great educational value, for it was here that Calvin Milton Woodward established the first manual training school in the United States.

Many records and traditions of forgotten attempts to bring educated minds to the workbench were combined inside the doors of this historical building. Undoubtedly Woodward's attempts to combine them were accompanied by much hard work and trying failure.

These ideas did not materialize over a short period of time, for during the seventies and eighties, during which time the Manual Training School developed, the economic condition of the United States was very unstable. Washington University, of which the Manual Training School was a department, was a small institution.
always struggling because of the lack of sufficient funds. Hence the financial backing of the school was always uncertain and presented a great problem in its development. There were also the traditional educators who believed that the sole purpose of education was to cultivate the mind only. These educators also presented a problem in the development of the school.

Woodward realized that there was a vast industrial advancement and a multiplication of occupations developing in America at that time. To cope with this situation there was a great need for technically educated men. In order for America to progress and become a great nation, its youth would have to receive a broader and more general education—one which would produce men who could both plan and then execute those plans themselves. The secret to the success of the American industrial system lies in the fact that educated people have entered industry as workers.

At the present time this is also true in the United States Army. In the past wars the master sergeants, the ones who were really the backbone of the fighting forces, many times had completed only the fourth and fifth grades in elementary school.

Woodward wanted the Manual Training School to be a place for life training as well as a place of learning,
one that would combine the training of the hand co-
ordinated with the training of the mind. When pressed
for a definition of manual training, Woodward answered
in the following manner:

    If people would take the trouble to seek for
the meaning not in the dictionary but in the or-
ganization of the school itself, its significance
will be readily seen."

Woodward was not alone in his belief that a broader
education should be set up in the school. He was only
one of many educators who realized the importance of
combining the work of the mind with the work of the
hand. This type of training, as interpreted by Woodward
and other prominent educators, was necessary to the
prosperity of the United States.

John D. Runkle, president of the Massachusetts
Institute of Technology, had become conscious of the
problem that was confronting Woodward. After viewing
the Russian system of tool instruction at the Centennial
Exposition at Philadelphia in 1876, Runkle understood
the importance of shop work instruction. He had ob-
served that the students who had a broader knowledge of
shop work had little difficulty in securing a position
upon graduation while those who did not have this knowledge
of shop work found it difficult to obtain a position.

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1 C. P. Coates, "The Veering Winds," Industrial Arts
Magazine, XV (September, 1926), 305.
Other educators who also had much influence on this new front in education were Frederick G. Bonser, professor of education at Teachers College, Columbia University; Frank M. Leavitt, professor in the University of Chicago; W. C. Russel, professor at Cornell University; and Charles H. Ham of Chicago University.

In spite of the many trying experiences which confronted Woodward, his unfailing optimism and vitality enabled him to accomplish the great task which he undertook. His influence on industrial arts has been one of lasting quality because his work was constructive in nature and his ideas far-reaching.

Although Woodward was not alone in his ideas that manual training should be a part of general education, he did construct and equip the first manual training school in the United States. It was this school that proved to many educators the importance and necessity of manual training in education.

Statement of the Problem

This study was made to determine the contributions of Calvin Milton Woodward to the field of industrial arts. His work will be analyzed so as to prove that his philosophy of manual training is directly related to the underlying philosophy of the industrial arts system carried on today. It will also be shown that his concept
of manual training would be applicable to the present-day system of industrial arts.

Definition of Terms Used

Industrial arts, as used in this study, will refer to that phase of general education that provides exploratory experiences through the uses of tools, materials, processes, and problems resulting from the sociological, economical, and technological orders which affect the daily lives in a dominantly industrial democracy.

Manual training, in this problem, is that part of general education which teaches the boy manual skill; familiarizes him with the different tools, materials, and processes, and teaches the hand and eye to work together.

General education will mean that type of education which is broad and flexible in nature, thus enabling the pupil to receive training in the practical arts as well as in the arts and sciences.

Industrial art, as applied in this problem, will refer to utilitarian objects in daily use rather than the so-called fine arts.

Limitation of the Problem

Although there were many educators around nineteen hundred who contributed much to the new front in education
known as the manual training program, this problem will be limited to the study of Calvin Milton Woodward's contribution to the ever-expanding program of industrial arts.

Source of Data

The data used in this study were obtained from books, periodicals, pamphlets, and encyclopedias on topics concerned with the life, work, and influence of Calvin Milton Woodward on industrial arts.

Treatment of Data

This study is presented in five chapters. The first chapter gives an introduction to the problem, the statement of the problem, the definition of the terms used in the study, the limitations of the problem, the source of the data, the treatment of the data, and related studies.

Chapter II is a presentation of C. M. Woodward's life—his birth and education, the positions he held during his role as an educator, his later life, and the influence of other educational reformers upon his life.

A discussion of the educational system which Woodward set up in the St. Louis Manual Training School and how it influenced the present-day philosophy of industrial arts will be given in the third chapter. This chapter will also discuss his educational writings and works and how they contributed to the change in the educational system and what influence they had on industrial arts.
Woodward's philosophy on manual training will be brought out in this chapter along with the definitions of manual training, industrial arts, and general education.

An evaluation of the philosophy of Woodward on manual training and attempts to correlate it to the present-day system of industrial arts will be presented in Chapter IV.

The concluding chapter is a summary of the contributions which Woodward made to the field of industrial arts.

Related Studies

A study of unpublished materials found in the office of the Industrial Arts Department of North Texas State College seemed to be closely related to the philosophy and practices of Woodward. Naturally, there are others who, indirectly, have had much to do with the industrial arts movement but no direct material was found.

The following statement is taken from the final paragraph in the summary of an unpublished thesis in the North Texas State College library:

The philosophy of industrial arts today is the same as the basic theory of Rousseau, "learning-by-doing." Many educational reformers since that time have believed that the growing mind of the child learns most readily to think clearly and effectively when engaged in doing. Rousseau expressed this idea when he said, as has been quoted before: 'Emile will learn more by one hour of manual labor than he will retain from a whole day's verbal instruction. . . . ' This is the fundamental concept underlying the thinking of both the Renaissance and
the modern advocates of educational handwork. While this philosophy seems very simple, yet for the past two hundred years we have been trying to find out what he meant by the above statement. The educational foundation of all industrial arts work in the schools is still that expressed by Rousseau and the evidence of its soundness seems increasingly convincing and is seldom questioned today.  

The following paragraph is taken from an unpublished thesis on Pestalozzi's philosophy concerning industrial arts in the North Texas State College library:

Work was part of the program in all of Pestalozzi's experiments. He believed that children should learn to work in school so that the experience would not only be of economic value but it would give valuable sense impressions. These sense impressions gained through work, like the study of objects, became the basis of knowledge. Pestalozzi taught the children while working in the fields, and enjoyment and benefits were gained in both. Pestalozzi recognized the fact that doing leads to knowing.

Froebel's philosophy is clearly stated in the following paragraph taken from an unpublished thesis in the Industrial Arts Department of North Texas State College:

Self-activity was one of the primary elements in the theory and practice of Froebel, as it is in the philosophy of the modern school, not only in the

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field of industrial arts but throughout many of the curricular areas of learning. Self-activity, in Froebel's sense of the term, implies not only that the learner shall do all himself, not merely that he himself will be most highly benefited by that which he does himself; but it implies also that at all times the whole self shall be active, that the activity should enlist the entire self. Thus self-activity requires not activity alone, but all-sided activity of the whole being, the whole self.4

While the philosophies of Rousseau, Pestalozzi, and Froebel were mostly theoretical in nature, Woodward was one of the first educators who actually put these theories into practice.

CHAPTER II

THE LIFE AND WORK OF CALVIN MILTON WOODWARD

The life of Woodward was a full and far-reaching one in respect to the work he accomplished in bringing about certain changes in the present-day system of industrial arts. Before studying his contributions to the present-day field of industrial arts, it is well to go back to the beginning and learn something of the time in which he lived and worked.

Calvin Milton Woodward was born in Fitchburg, Massachusetts, on August 25, 1837. He was the great-great grandson of John Woodward, who settled at Westminister, Massachusetts, in 1751. He was the sixth of eleven children of Bernapp Woodward, Unitarian minister, who also was a farmer and a bricklayer. Although Woodward did not come from an exceedingly wealthy family, he did attend the common schools and supported himself in Harvard College where he graduated in 1860 with high honors.

From 1862 to 1863 he served as a captain in the Forty-eighth Massachusetts Volunteers. Except for this short period of time, Woodward spent the Civil War years
as principal of the Brown High School in Newburyport, Massachusetts, where he married Fanny Stone Balch, September 30, 1863. It was during this period of Woodward's life in which he began to realize the great need of a change in the curriculum of the public schools.

After receiving his A. B. degree from Harvard College, he entered Washington University from which he received his Ph. D. degree in 1883 and the degree of L. L. D. in 1905. Upon graduation from the Washington University he was awarded a membership to Phi Beta Kappa; later on he was made a member of the Tau Beta Phi chapter of the University of Illinois.

In September, 1865, Woodward became assistant principal and teacher of mathematics in Washington University. The following year he was made principal of the O'Fallon Polytechnic Institute, which became a part of the department of engineering of Washington University in 1868. He served as dean of this school from 1868 until 1896. In 1901, the School of Engineering and Architecture was reorganized, and Woodward returned to the position of dean of the school and remained there until 1910, at which time he resigned from active service so that he

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might give more attention to the preparation of publications in his field. ²

It was in 1880 that Woodward accomplished his most important work as originator and director of the St. Louis Manual Training School. This private school for boys, which was opened under the direction of Washington University, brought world-wide attention from its very beginning. The Manual Training School was based on a foundation of general education at the scholastic level of the public high school. It became the leading educational experiment of its time, and was the model from which similar schools were established in other leading cities a short time thereafter.

In discussing the outstanding features of manual training as set up in the Manual Training School, Hargitt made the following statement:

Dr. Woodward declared that the essential feature of manual training was a systematic study of tools, processes, and materials (according to a Report of the Commissioner of Education), and urged that such work be adopted by schools not only to aid those inclined to industrial life, but as a means to enable those who have no career in mind to discover their inborn capacities and aptitudes; whether in the direction of literature

²George Harold Hargitt, "Dr. Calvin Milton Woodward--His Life, Influence, and Place in the Century of Public Education of St. Louis," Industrial Education Magazine, XL (May, 1939), 149.
science, engineering, or the practical arts. As he often declared, put the whole boy to school. 3

There is no better way to describe the dual purpose of Woodward’s Manual Training School than to quote the famous motto inscribed over the door of the old building at Eighteenth and Washington Streets in St. Louis, which reads,

Hail to the skillful cunning hand!  
Hail to the cultured mind!  
Contending for the world’s command,  
Here let them be combined. 4

Woodward’s influence was very broad and was recognized the world over. He accepted a formal invitation from William Mater, a member of the Royal Commission of Technical Education, to present a number of lectures of the topic of manual training at different educational conferences in England during the winter of 1885-1886.

He was a member of the St. Louis Board of Education from 1877 to 1879 and from 1897 to 1911. Woodward served as president of the St. Louis Board of Education for three years. He was also a member of the Board of Curators of the University of Missouri from the year of 1891 to 1897. He served as president of this board between the years of 1894 and 1897. He served as president of the American Association for the Advancement of Science, during the

3 Ibid.  
years of 1905 and 1906; of the St. Louis Academy of Science, from 1907 to 1908; and of the North Central Association of Colleges and Secondary Schools, from 1909 to 1910. It is well to note that the North Central Association of Colleges and Secondary Schools was the first to recognize the possibility of accepting credits for manual training for entrance into the colleges of their association during the time Woodward was serving as president of that association.  

Although Woodward carried much influence in all the positions he held, his greatest influence on manual training in the St. Louis public schools was felt during the time he served as a member of the Board of Education. At one of the board meetings in 1897, Woodward offered a resolution that a committee be appointed to make a study of manual training in the public schools as to the extent to which manual training had been entered into the American system of education and its value to the education of the average child.

So it was that, on April 12, 1898, the committee, with Woodward serving as its chairman, presented their findings on the study they completed with respect to manual training. This voluminous report consisted of

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5Hargitt, op. cit.
investigations of all cities of importance in this country as well as those in Europe. Through this study, the committee had come to the conclusion that manual training should be included in the elementary and high schools of the city as soon as means would permit. By action of the Board of Education, manual training was made a part of the regular curriculum of the schools in that district in the year 1899-1900. This marked the beginning of manual training in the public schools of this country. It was also the beginning of a new type of education that was general in nature and presented to the student a type of work that was both interesting and useful in everyday life.

To indicate the ideas of manual training held by the Board at that time, Woodward made reference to Volume X, page 515, of the proceedings of the Board of Education, as follows:

Systematic manual training is of recent origin. It is as unlike the trade training which has long prevailed in Europe as gymnastics is unlike manual labor. It is strictly and purely educational, and has documents from England, Germany, South America, and Australia, all speaking of manual training as an essential element of modern education, and all giving credit for the work which has been done in that direction in your city. Half of the educational world thinks that the St. Louis Manual Training School is a part of the public school system.

The establishment of manual training in the United States was not effected without a struggle. Educational War, more or less bitter, was waged for ten years. But the war is over. In the
struggle for existence, manual training has gloriously survived.

Woodward's life was filled with much hard work due to the duties that accompanied the many positions which he held in the field of education. In spite of all this work, he found time to write several books and articles. Some of his outstanding writings are *History of the St. Louis Bridge*, written in 1881; *The Manual Training School*, 1887; *Manual Training in Education*, 1890; *What Shall We Do With Our Boys*, 1898; and *The Rise and Progress of Manual Training*, 1896. These are just a few of the many books and articles which Woodward wrote during his lifetime.

It is well to say that through these writings many prominent men in the field of education were made to realize the importance of manual training as a part of general education, as will be shown in the following chapter.

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*ibid.*, p. 150.
CHAPTER III

WOODWARD'S PHILOSOPHY AND INFLUENCE ON INDUSTRIAL ARTS

Before one can make an intelligent study of the place of industrial arts in the present-day educational system, it is well to survey the factors which lead to its development in the United States.

In 1865, John Boynton of Massachusetts gave one hundred thousand dollars for the support of the youth in Worcester County. The school that was set up with this money was known as the Free Institute for the Youth of Worcester County, Massachusetts. This school was designed to instruct the youth in those branches of education not usually taught in the public schools; that is, such courses as mechanics, manufacturing, and farming.

The Worcester Free Institute was opened for students in November, 1868, as a technical school for children sixteen years of age and older. In the same year, 1868, Victor Della-Vos introduced into the Imperial Technical School at Moscow the Russian method of tool instruction.1

The students in the imperial school were eighteen years old upon admission, and all of them were to become engineers for the Russian government upon graduation. The result sought in the Russian system of teaching the mechanic arts was to teach the fundamental principles in the least possible time and in such a way as to make it possible to give adequate instruction to a large number of students at one time. It also provided a method that would enable the teacher to determine the progress of each student at any time.

The next step forward was taken when the Philadelphia Exposition of 1876 was opened. Little was known about the true educational methods of tool instruction up to this time. The Exposition presented a clear and definite picture as to the methods used in the Russian system of tool instruction.

It is clear that the Russian system of workshop instruction in the mechanic arts did not originate as a means of teaching shop work in a scheme of general education for students of secondary school grade. Too often the Russian system of shop work has been introduced into the curriculum of public schools. In each case, the system failed because of its technical nature. Contrary to the popular belief, the Russian system grew out of a great need for a better system of presenting shop instruction as a part of the
technical education of students of college level. It also presented a more economical and more effective school substitute for apprenticeship than had ever been devised at any previous time.  

The Manual Training School, which was a department in Washington University, was opened in September, 1860, under the supervision of Calvin Milton Woodward. Woodward is often referred to by many writers and speakers as the father of manual training in the United States. Conservatively speaking, it might be said that few men have contributed more than he in determining the content of shop work organized for instruction and methods of teaching, and in arousing the interest of the educators as well as of the public.

As professor of mathematics in Washington University, Woodward had occasion to teach a class in applied mechanics. In order to make the work more objective and more easily understood, he asked for the aid of Noah Dean, the college carpenter, in arranging the necessary work benches, tools, machines, and materials for construction of working models to illustrate the various mechanical principles involved. However, he discovered that the students were unable to construct the simplest things with carpenters' tools.

2C. A. Bennett, History of Manual and Industrial Education up Until 1870, p. 46.
"Instead of giving up his plan for helping the young men to visualize the fundamental mechanical forces he proceeded to teach them how to use the tools."\(^3\) It was this incident that led to the teaching of shop work at first, with no trade or industrial motive behind it.

Shortly after this, certain tool exercise pieces were devised as the most direct and speedy means of teaching the young men how to use the tools correctly. In the following year, Woodward made an address at Washington University discussing his conception of the place of a workshop in education. He stated that the course should extend through the entire period of four years. By 1875, Woodward had a well-organized program of shop work, with courses of studies and methods of teaching worked out.\(^4\)

Many great educators had grave fears as to the outcome of Woodward's experiment in which he combined the liberal arts and the mechanic arts and placed them in the same curriculum. It was thought that the introduction of tools, machinery, materials, the theories of construction, and drafting might not only break up the orderly program of the school, but lower its intellectual and moral tone.\(^5\)

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\(^3\)William T. Bawden, "Some Leaders in Industrial Education," Industrial Arts and Vocational Education, XXXVI (September, 1947), 278.

\(^4\)Ibid.

It is now known that all of these thoughts and fears were groundless, for manual training has opened many new and useful types of culture to many pupils, and has enabled the graduates to choose their vocations much more wisely, either in the direction of industrial arts or in many other fields.

When the Manual Training School was set up in St. Louis it was strictly a pioneer school. There were no guides for it to follow except the ideas and reasoning of the educators who were definitely interested in its development. For this reason it was very hard to keep the school running smoothly at all times.

It is true that there were many trade schools in Europe which were in operation at this time, but these trade schools were set up on the theory of apprenticeship; that is, to put the boy in a factory and teach him to become skilled in only one trade. In direct contrast to the theory of the manual trade schools, Woodward gave the theory of the manual training school in the following way:

We did not wish to organize a school in a factory, neither did we wish to attach a factory to a school, but we wished to enlarge the school by the introduction of a symmetrical course in tool work which should be strictly educational.6

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6Ibid.
Woodward thought that manual training should be similar to geometry, in that the main object was not to collect mathematical facts, but to learn the underlying principles. In other words, the most valuable thing for a student is an absolute comprehension of the methods of reasoning. This same theory holds true today in educational tool work. The form or model to be executed does not represent the value of the training; the valuable thing is that which remains in the boy's head and hands, and these things can best be retained through training with tools and materials.\textsuperscript{7}

The nature of the work of a manual training program depends upon the purpose and the aims of that particular program. The leading motive behind any manual training program is mastery--mastery of the external world, mastery of tools, mastery of materials, and mastery of processes. It was only during the latter part of the nineteenth century that the mechanical arts had been studied, analyzed, and arranged in such an order that it might be taught. It had always been assumed that the only way to learn to use tools and to master materials and mechanical processes was to go into a shop as an apprentice or associate with workmen engaged in ordinary commercial work.

\textsuperscript{7}Ibid., p. 929.
The idea of teaching the mechanical arts in a school was a new thought, just as it was a new thought when law, medical, naval, and military schools took the place of the courtroom, the doctor's office, the deck of a ship, and a military camp.

It is well to note that Woodward was not thinking of future occupations so much as he was thinking of general preparation for life. Many mistakes have been made, arising from the wrong concept of the object of manual training. For instance, in one locality manual training has a strong tendency to run into trade training; in another it may run into art work; and still in another it may run into the factory idea and aim at production rather than education. In other words, the shop instruction which was to be presented in the manual training school was designed in such a manner as to teach students the fundamental principles of tool instruction rather than to teach a trade.

Too many people think of manual training as manual labor, but there is a distinct difference between the two terms. For example, a farm boy may have manual labor on a farm and learn to use correctly the hoe, the shovel, the plow, the scythe, and the ax; but he may not have had any

*ibid.* p. 928.
dealings with the proper use of bonch tools or machine tools until the mowing machine came into existence. Had this farm boy taken manual training along with the manual labor which he received on the farm it would have been of great value to him.

To emphasize the importance placed upon manual training, Woodward quoted a conversation between himself and a carpenter who was watching some boys in the manual training school making their first weld in the forging shop. Woodward said to the carpenter,

'You seem to like to see the boys work. Do you understand what they are doing?' 'Yes,' replied the carpenter. 'I worked a year once in a blacksmith shop.' 'Well,' said Woodward, 'then I suppose this operation of welding is a very simple matter to you.' 'Not at all,' said he. 'I never made a weld in my life. I never got a chance. I kindled the fire and pumped the bellows, and I did some striking for other men, but they never let me try to make a weld. These boys learn more in one week about the really essential art of forging than I learned in half a year, and the secret of it is, they have a thoroughly skilled workman who is competent to teach and to use practically every principle involved, and who does nothing but teach.'

The first teacher that Woodward employed in his Manual Training School was recommended as the most skillful mechanic in St. Louis. For this reason, Woodward assumed that this was just the man that he needed, but on the contrary the man was a complete failure as a

\[9\text{Ibid., p. 929.}\]
teacher. He could not rid himself of the idea that the exercise for the day was not the main thing, and in every instance he would do the work himself rather than directing the boys in doing it. This was because he had received his training as an apprentice and was skillful only in doing the work himself rather than teaching others how to do it.

Woodward believed that all shops should be set up so as to have the pupils' chairs and stools around the teacher's bench, which would be located in the center of the room. By this arrangement, the students could sit, observe, and listen while the teacher was either lecturing or demonstrating.

In the Manual Training School the boy was taught, from the beginning, which tool to use and how to use that tool correctly. If he was not taught from the start how to use the tools correctly he would invariably use them incorrectly and therefore the object would not be that of manual training but that of the finished article. As Woodward stated time and time again, the main objective of manual training is to teach the boy and not the exercise. 10

10 Arthur F. Payne, Methods of Teaching Industrial Arts, p. 15.
To justify the making of the exercises, they should, after completion, be so organized that they may be constructed into what is known as projects. Such projects should be an end through the mastery of the exercises; that is, a project should have combined within its construction all the exercises that are desired by the instructor. Too often the teacher places too much emphasis on the completion of projects rather than placing the emphasis upon the mastery of the exercises or jobs that go into making up those projects. In many cases, this is still being carried on today in the modern industrial arts shops in the public schools.

Woodward emphasized the idea that all exercises should come in a logical sequence and that there should be as little repetition of these exercises as possible.

As Professor Balliet well said: 'Any process in manual training ought to stop when it ceases to be brain work. Here we have the difference between the manual training school and the trade school.'

Probably one of the most outstanding economic features of manual training is the power of mechanical analysis that is involved throughout its many different areas of learning. This is one thing that manual training teaches the student that cannot be learned from books, lectures, or notes. It can be learned only by actually working

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with the tools and materials under the guidance of a person who is skilled in presenting such information. To further describe this ability, Woodward made the following explanation:

The ability to analyze a complicated series of operations into a series of simple steps, logically arranged, leads to the habit of always making an analysis in every concrete problem; and that habit once formed has its influence upon every mental operation, whether concrete or abstract. It runs into every exercise the student has in mathematics, in language, in literature, in science, in ethics, and in art. Of course, this fruit is intellectual, but it matures best when the hand, the eye, and the brain are cultivated together in a logical course of manual training during the school period.\(^{12}\)

The Manual Training School was not set up as a place to control dull or lazy boys who could not make progress in the academic courses presented in the public schools. In presenting the course of study of the Manual Training School, Woodward did not assume that there was too much moral and intellectual training in the public schools, but that there was too little manual training for the ambitious American boy. The purpose of the Manual Training School was to find time for drawing and tool work during the school day and thus secure a more intellectual and physical development for the boy. It was also believed by Woodward that the value obtained from

\(^{12}\text{i}b\text{d.}, \text{p. 932.}\)
manual training, with only eight or ten hours a week devoted to the course, would more than justify the expense of the tools, materials, and teachers.\(^\text{13}\)

It was noted that students who had special aptitudes in certain fields had much difficulty in mastering subjects in other fields. In such cases, it would be logical to yield to the natural tastes or interests of the pupil rather than force upon him courses of no interest. Because of these different interests and aptitudes of the students, Woodward wanted to introduce the element of manual training as a part of the general education in the public schools.

A great aptitude for handicraft is often accompanied by a strong aversion to abstract and intellectual courses. In such cases, it is safe to assume that more time should be spent in the shop and less time in the lecture and recitation room. On the other hand, one who has a great aptitude for the use of language often has a lack of mechanical interest or power. In this event, the pupil should be sent to grammar and diction courses rather than being sent to the shop or drafting room.

It was earnestly believed by Woodward that through the development of the Manual Training School, such

serious errors as the choice of vocation, which so often proves fatal to the pupil, could be eliminated to a great extent. The school also presented a greater appreciation of the value of intelligent labor and of laboring men since once a boy has had shop experience, whether skilled or unskilled in his work, he will appreciate and respect the workman who has acquired skill through hard labor.

Too often people assume that every boy who enters the manual training school is to become a mechanic. This was the object of the trade schools but not of the manual training school. Some students will have no taste for manual training and will turn to other paths such as law, medicine, or literature; others will continue and become skilled engineers, scientists, et cetera; but all concerned will gain intelligence through their experiences with tools, materials, and processes. As Woodward put it, "the grand result will be an increasing interest in manufacturing pursuits, more intelligent mechanics, more successful manufacturers, better lawyers, more skillful physicians and more useful citizens."

It is well understood that shop work in the Manual Training School did not teach a trade, nor did it manufacture articles for sale, but it was disciplinary in

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The novelty of the school has by no means worn off, at least to outsiders. Travellers along Washington Avenue, as they pass the handsome and substantial-looking building, turn to look again at the massive fly-wheel which revolves in full view through the front windows. If one ventures inside the building, as we did recently with great satisfaction, he experiences first a feeling of surprise and strangeness, and later a sense of completeness.
In classrooms, removed from all din of tools and the vibration of machinery, are sections of eighteen or twenty boys, each reciting lessons in Algebra, or History, or Latin or Physics. In the draughting rooms one section is learning line-drawing, or how to represent objects by their exact orthographic or isometric projections.

If a visitor sees only the study, recitation and drawing-rooms, the impression made is like that produced by a high school in which comparatively little attention is paid the ancient languages and history, while special attention is paid to theoretical and practical drawing, and to elementary physics.

On crossing the hallway to the shops the scene changes. The same lads that a few minutes before we saw reciting a lesson are now in 'shop dress!' engaged in the study and practice of tool work.16

In setting up the manual training program Woodward did not advocate the abolishment of literary studies from the curriculum of the public schools; he wanted only to establish additional courses, which were truly liberal in nature. At that time there was an increasing tendency to require school attendance up to a certain age. The desire for more schooling and higher education was being indicated both through legislation and through public opinion. The schools were in dire need of a program which would create interest for the students and thus cause their attendance to increase.

The following was the result achieved in Kansas City after its manual training school was inaugurated into the

curriculum. Its high-school attendance, over a period of seven years, increased 100 per cent while its population increased only 50 per cent. From the start, the enrollment of the manual training school was as follows, beginning with 1897: 843; 1,114; 1,244; 1,492; 1,677; and 1,706 in 1903. Woodward did not attribute this increase entirely to the manual training school, although he did believe it to be one of the main factors involved. He also believed that increased wealth, improved social conditions, and the fact that education was becoming known as a good business investment had much to do with the increase in the enrollment in the schools.

Woodward was in favor of classical training but he stressed the fact that this training did not cover the whole field of secondary education, and that, alone, it did not meet the wishes and needs of a great majority of the fourteen-, fifteen-, and sixteen-year-old boys and girls. According to Woodward it was not necessarily a question of brains, morals, and health, but a question of environment, taste, ambition, and outlook.

The idea of understanding with all subjects being presented was a point that Woodward stressed very strongly.

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18 Ibid.
in defense of the Manual Training School. On behalf of the manual training element in the public schools, the following statement was made by Woodward:

Whether we teach Latin, geometry, physics, or the theory of a tool, or a process of construction, let us give our pupils understanding. The pupil who has formed the habit of understanding what he sees or reads or handles will carry into the world the habit of studying life’s problems with eyes, hands and brains, till he understands them.  

The reason given by Woodward for the small percentage of boys and girls entering high school was incompatibility. In other words, the schools did not give the students the things which they wanted and in which they were interested.

However, because a student does not want what the school offers does not mean that the student is dull or unreasonable. The student sees the world around him working and he realizes that he must work also. For this reason, it is difficult for a student to respect such courses as ancient history and traditions of hundreds and thousands of years ago. Instead, he wants the latest news bulletins on the things that happen which will affect his everyday living. In other words, the pupil wants to do the type of work that is both practical and interesting to him. Woodward believed that Robert Ingersoll told the truth when he made the following statement:

19 Ibid.
Much that is called education simply unfits men successfully to fight the battle of life. Thousands today are studying things that will be of exceeding little importance to them or others. Much valuable time is wasted in studying languages that long ago were dead, and histories in which there is no truth.\(^{20}\)

Wilson when president of Princeton said the colleges were set up for the minority instead of the majority. To this statement Woodward made the following reply:

The average secondary school, if it prepares pupils for anything, it prepares them for college; and since the college is not for the majority, the secondary school is not for the majority. What then is there for the majority? If they are to have secondary education at all it must be something different.\(^{21}\)

From this statement it is clearly seen that the curriculum must be broadened so as to touch modern life, modern conditions, and modern responsibilities. As Woodward said,

It is a thousand times more interesting and more useful to the average boy to know how modern engineers tunneled under the Alps than to read the fabulous stories of how Hannibal made a road over them; to know how Eads built a ferry bridge across the Mississippi, than to decipher Caesar's Foot-bridge over the Rhine; to master the useful language of drawing than to get a smattering of a language which no one speaks and no one writes.\(^{22}\)

It was this movement toward a study of materials and the study of the problems of modern life, both commercial and industrial, that first made the public aware of the change of front in the educational system of the

\(^{20}\)Ibid. \(^{21}\)Ibid., p. 228. \(^{22}\)Ibid., p. 229.
public schools. However, this did not mean that the courses in the old educational system were going to be abandoned. On the contrary, all the courses that were permanently fine and essential to high thinking were to be reserved. Modern education was becoming more and more liberal although many thought differently about it. As Woodward put it, "what can be more human than human life as we see it and as we share it?"23

The manual training school with its opportunities for training and culture in the industrial, commercial, civic, artistic and literary lines seemed to come near the ideal but at that time there was much opposition to its being entered in the curriculum of the public schools. Woodward advocated the natural right of a boy to the privilege of choice of occupation at an age of some maturity which would enable him to substitute good judgment for a boyish whim.

In the development of the Manual Training School it was felt that a boy who expected to become a mechanic in one of the many trades would greatly profit by receiving a systematic course of instruction and practice in drafting and manual training in the public school.

At that time there was no place in the whole industrial system where this type of instruction could be obtained except in the manual trade schools. The objection to the manual trade schools was that their curriculum covered only that phase of education which pertained to specific trades and did not deal with any part of general education. Woodward, along with other educators, deemed it necessary to organize an establishment to guide the boys who wanted to be educated as well as trained. The desire to bring out the natural aptitudes of a boy, that is, to teach him how to choose an occupation wisely, was also another important motive which supported the first Manual Training School.

It was evident that the majority of boys when graduated from high school stepped out into the world without any adequate means of choosing a job except as a matter of environment. By this statement is meant that if a boy graduates from high school and does not follow the trade of his father, then he is at a total loss as to what type of occupation to choose. The money that was first contributed toward the organization of the manual training experiment in St. Louis was given with a distinct understanding that it was to be a department in which a boy might find out what his natural and legitimate
bias was, if he had one, so that his future career might be selected advisedly. 24

There seems to be no doubt that the manufacturers and businessmen who put money into Woodward's venture expected to receive young men so trained that they could go into the field of industry as skilled workers. In this way the businessmen would reap the benefits of their money invested in the school. However, so far as literature shows, they did not ask for any particular phase of education to be taught in the school.

It was believed that the introduction of shop work and drawing would give boys an opportunity to consult their tastes and exercise their powers, which, as a consequence, would cause their school to become more attractive; and that those who had been dull, unhappy, and troublesome might become bright, happy, and successful students. Likewise, if a boy was given an opportunity to do the things that he has a desire to do, then he would not be so reluctant to deal with the more distasteful subjects such as grammar.

In calling attention to the strong moral influence of manual training and to its effect in promoting clear and definite thinking, Woodward referred to a statement

which was made by William James of Harvard University, as follows:

The most colossal improvement which recent years have seen in secondary education lies in the introduction of the manual training schools, not because they will give us people more handy and practical for domestic life and better skilled trades but because they will give us citizens with an entirely different intellectual fibre. Laboratory-work and shop-work engender a habit of observation, a knowledge of the difference between accuracy and vagueness and an insight into nature's complexity, and into the inadequacy of all abstract verbal accounts of real phenomena, which once brought into the mind, remain there as life-long possessions. They confer precision, because, if you are doing a thing, you do it definitely right or definitely wrong. They give honesty; for when you express yourself by making things and not by using words, it becomes impossible to dissimulate your vagueness or ignorance by ambiguity. They beget a habit of self-reliance. They keep the interest and attention always cheerfully engaged, and reduce the teacher's disciplinary functions to a minimum.

It would be hard to say that the progress in pure science, as set up in the schools at that time, was the cause of the beginnings in the industrial life in the middle of the nineteenth century. However, it would be well to note that such things as the conservation of energy, the theory of structures, the strength of materials, and the art of drafting preceded nearly all of the important inventions and improvements in industry and transportation. Therefore, it would be reasonably

25 Ibid., p. 1130.
safe to say that the scientific schools did influence the growth of the agencies which encouraged the development of the manual training program as a part of the curriculum of the public schools.\textsuperscript{26}

In the Manual Training School a knowledge of the job to be completed was presented to the student before the theory behind this job was given. For example, if instruction on the correct use of the hammer or mallet was being presented to the students, very little was said about momentum and the kinetic theory of energy. When the students learned how to use the tools properly they then made use of this knowledge in the study of general principles and in the expression of thought. It is a well-known fact that when mastery of anything is gained through thought and experience, it has with it much human interest which will help in dealing with the problems and duties of real life. For this reason, it is easy to see that manual training, as a part of general education, would be of great value in the development of interest among the students.

Woodward did not think of manual training as the sole type of education to be presented to the pupil. He thought of manual training as only that part of education which is essential to prepare the pupil, as he leaves the school, to face the world in reality rather than in dreams. Manual

\textsuperscript{26}Ibid., p. 1129.
training should stand side by side with the whole educational program and be judged by the fruit that it bears.27

In one of his many speeches made concerning the Manual Training School Woodward illustrated the point that the school was not set up as being technical in nature in the following statement:

The pupil must creep before he can walk, and he must walk before he can run. In the Manual Training School we can hardly claim to do more than to help him to walk.28

Woodward's underlying plan or philosophy when developing the Manual Training School was the combination of theory and practice. The combination of theory and practice in any phase of work, whether it be in the school or outside of the school, would be a great improvement over the teaching of either alone. The primary object of the tool work in the Manual Training School was to gain a mastery over materials and certain conventional tools and processes. The question as to what would be done with the tools and materials after they had been mastered would not be considered in the Manual Training School itself. Woodward believed that by entering the element of manual training in the public schools, "the sense of mastership, of ability


28Ibid., p. lix.
to smash, to break, to overthrow, which leads the undisciplined, unskilled youth to commit vandalism, may be converted into a sense of ability to build, to invent, to construct, to create, which leads to such things as bookcases, dynamos, engines, and cameras."²⁹

In the Manual Training School the pupil was taught the proper use and care of tools before he was allowed to construct different projects. For example, the boy was taught how to sharpen a plane bit until it was razor sharp; he was taught how to take the plane completely apart and then how to reassemble it; how to set the blade to make different cuts; and how to hold and push it in order to insure smooth even cuts. All of these fundamentals were taught without any reference as to what the pupil would make with the plane once he had mastered it. In a similar way, he was taught the proper use and care of all the tools to be used. From this, one can very easily see that the Manual Training School was set up in such a way as to teach the pupil and not the project.³⁰

Because people were doubtful concerning the intellectual, moral, and social standing of the graduates of schools which had a thorough course of manual training, Woodward presented the records of the graduates of the Manual Training School connected with Washington University in St. Louis.

²⁹Ibid., p. lx. ³⁰Ibid.
Table 1 shows Woodward’s report of the records of the graduates.

TABLE 1

OCCUPATIONS OF THE GRADUATES OF THE MANUAL TRAINING SCHOOL OF WASHINGTON UNIVERSITY, ST. LOUIS*

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and stock raising</td>
<td>14</td>
</tr>
<tr>
<td>Architects</td>
<td>24</td>
</tr>
<tr>
<td>Artists</td>
<td>4</td>
</tr>
<tr>
<td>Banking</td>
<td>7</td>
</tr>
<tr>
<td>Bookkeepers, general assistants and clerks</td>
<td>153</td>
</tr>
<tr>
<td>Cashiers</td>
<td>5</td>
</tr>
<tr>
<td>Chemists</td>
<td>9</td>
</tr>
<tr>
<td>Contractors</td>
<td>2</td>
</tr>
<tr>
<td>Dentists</td>
<td>4</td>
</tr>
<tr>
<td>Draftsmen</td>
<td>100</td>
</tr>
<tr>
<td>Electricians</td>
<td>19</td>
</tr>
<tr>
<td>Fieldsmen</td>
<td>4</td>
</tr>
<tr>
<td>Foremen</td>
<td>3</td>
</tr>
<tr>
<td>General managers</td>
<td>32</td>
</tr>
<tr>
<td>Insurance</td>
<td>9</td>
</tr>
<tr>
<td>Lawyers</td>
<td>30</td>
</tr>
<tr>
<td>Library</td>
<td>1</td>
</tr>
<tr>
<td>Mechanics</td>
<td>12</td>
</tr>
<tr>
<td>Merchants and manufacturers</td>
<td>90</td>
</tr>
<tr>
<td>Ministers</td>
<td>1</td>
</tr>
<tr>
<td>Physicians</td>
<td>22</td>
</tr>
<tr>
<td>Real estate</td>
<td>18</td>
</tr>
<tr>
<td>Reporters</td>
<td>2</td>
</tr>
<tr>
<td>Salesmen and agents</td>
<td>41</td>
</tr>
<tr>
<td>Students</td>
<td>50</td>
</tr>
<tr>
<td>Superintendents of manufactories</td>
<td>44</td>
</tr>
<tr>
<td>Teachers</td>
<td>39</td>
</tr>
<tr>
<td>Technical engineers</td>
<td>63</td>
</tr>
<tr>
<td>U. S. Navy engineers</td>
<td>4</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>12</td>
</tr>
<tr>
<td>Unknown</td>
<td>56</td>
</tr>
<tr>
<td>Number who have taken degrees elsewhere after leaving the Manual Training School</td>
<td>150</td>
</tr>
</tbody>
</table>

From these listings one can readily see that the Manual Training School was not designed for the one single purpose of making all the students skilled mechanics. It was well understood that all boys do not have the ability to be good mechanics nor do they have the desire to do that type of work. In fact, one of the primary purposes of the Manual Training School was to find where the interest of the pupil lay.

The value of manual training when properly combined with its related studies such as science, mathematics, literature, et cetera, is shown in many and varied ways. Some of the advantages of manual training as a part of general education will be discussed in the following paragraphs.

It was estimated that the attendance of boys in the high school where manual training was introduced increased 33 per cent. The effectiveness of manual training in any school was shown through the unusual attendance of boys in that particular school. Several hundred pupils entered the St. Louis Manual Training School who probably would not have entered any other institution, yet 50 per cent of those who entered completed the course.

The director of the Chicago Manual Training School said that many boys who entered the regular high school with the expectation of taking the full course dropped out
rapidly, yet those classes in the manual training school remained crowded. These boys did not seek the manual training school as a means to escape mental toil, for in addition to their shop work they had to take their regular academic studies; thus, the boys' day in the manual training school was actually longer and contained more work than that of the traditional schools. It is logical, therefore, to say that when a school is found interesting and attractive, boys will come and stay. In other words, manual training as a part of general education tends to keep boys longer at school.\(^{31}\)

It was noted, through many reports from parents of the boys who went to the Manual Training School that the interest of the boys in school was great. This was because the boys would go home and tell their parents of the things that they had accomplished in their work in school. This interest was built through the habit of applying what one knows with what one does—which is the philosophy of the Manual Training School as set up by Woodward. While this philosophy had been discussed by many great educators, it was not actually put into practice until Woodward set up the St. Louis Manual Training School. One can clearly see that manual training in the public schools awakens a

lively interest in those schools and invests dull subjects with a new life. 32

The pupils in the Manual Training School were so interested and so much impressed with the value of what they were receiving, that mischief and foolishness were a thing of the past. Administrators believed that the moral influence of manual training alone was worth the cost of the entire manual training program. Its influence was noticed out of school as well as in school. Many parents reported that the school interests affected their children's choice of recreation. After attending the Manual Training School, many students spent a good part of their spare time working in small shops which they had built in their homes. By keeping the boys busy outside of school they had little time in which to get into mischief. In regard to discipline the manual training school keeps boys out of mischief both in and out of school. 33

To show the influence of manual training schools throughout the country, Woodward referred to an editorial written in the Boston Herald. It read as follows:

The whole boy is put under subjection to discipline--not his intellect alone, not his hand alone, but the mind, the hand, and the will in combined

32Ibid., p. 128.

action. From a knowledge of the kind of boys here brought together, it is easily seen that this school is solving in part a great social question. The difficulty in a great city like Cambridge is to know what to do with the boy who is growing up into manhood. He does not have so good a chance as the youth on the farm, and he cannot turn his hand to useful employment so easily as he could in a city presenting the opportunities which are found in Boston. The tendency of such youth is to fall into bad ways, and to go from bad to worse. While the Cambridge Manual Training School does not deal with a single class of boys, it has brought within its scope a large number of youth who were without occupation, ambition, or enthusiasm. The boys have been really re-made. All they wanted was something that interested them... The transformation that has been reached in some of the wild Cambridge boys, by their stay of one or two years in this school of industry, has been a marvel and a joy to their parents and friends.34

The manual training school gives boys with strong mechanical aptitudes, but who are slow of speech, an equal chance with boys who have glib tongues and good memories.35

The majority of normal, healthy, high-school boys are so constructed that their interests are not in the form of words, speeches, and information from books. Woodward, in his Manual Training School, did not advocate that the academic courses such as literature, speech, mathematics, and science be removed from the curriculum. He thought that the academic subjects were essential to a

good general education for the pupil; but he believed that there should be more constructive subjects, such as the ones included in the Manual Training School, correlated with the academic subjects. In other words, the combination of academic subjects with the manual training subjects would be like combining the brain with the hand, which would be the goal of any educational system.

There had been many boys who had left school for the reason that they were slow of speech and could not grasp the memory work that was necessary in the academic courses. Had these boys received an opportunity to supplement their studies with shop work, their ambition could have been aroused along with their creative powers. These boys were not necessarily dull; their intellectual powers may have been very strong, yet their strength did not lie in the direction of memory. Woodward summarizes this point very effectively in one sentence in which he says, "I have seen boys almost made anew by the realization that they were not dunces after all, and that there was more than one criterion of success."36

In manual training a boy learns the truth in a practical sense. For example, if a wood joint is not cut exactly right it will not fit—the wood does not lie. Through this type of work the boy learns to respect the

36 Ibid., p. 130.
truth for there is no kind of work that can correct the bad joint which has just been cut. Therefore, if honesty and truth express themselves so vividly in deed, then they will also express themselves in words. This appreciation of quality in manual work cannot help causing a similar quality in character, conversation, and life. Through his manual work the pupil learns to love and respect honesty and truth, not by resisting, but by seeing through actual experience that dishonesty and lies are a sign of weakness and incompleteness. Therefore, it may be said that another advantage of manual training is that it stimulates a love for truth, simplicity, and intellectual honesty. This is, "a more wholesome moral education."

Shop work teaches the student how to express his thoughts and experiences. It is much like the use of correct language; that is, correct language does not depend upon what one reads so much as it does on being around people who speak correctly. It is known that the majority of one's forcible words are derived from the everyday world in which he works and lives, and cannot be defined by other words, but must be felt and experienced in order to be understood. For this reason shop activities serve as a supplement to the other courses in the curriculum.

Thus it may be said that the "correct notions of things, relations and notions, derived from actual experience" are another value placed upon manual training.38

Through the knowledge gained in the manual training school the student is prepared to make a better and more sound choice of occupation upon graduation. The majority of the pupils who graduate from school have very little, if any, conception of what the world has in store for them. Their occupation is usually the result of chance or environment. The boys who live near the wharves usually become sailors; the schoolmaster's son teaches school. On the other hand, if the boy breaks away from his environment in choosing a job he will probably be taking a chance with the odds against him. At the time Woodward founded the Manual Training School, the main question was to what extent should the school undertake this task and to what degree should the home undertake it.

In most cases it was found that the pupil who had special aptitudes in one field had great difficulty in mastering subjects in other fields. In such cases, it would be logical to yield to the natural tastes and assist the student in finding the proper type of work and study. In adding the element of manual training to the

38 Ibid., p. 133.
public schools it would give the students a broader field in which to work and study toward their chosen interests.

There was, at the time of the Manual Training School, and which still exists today, a common belief that it requires no great amount of brains or intelligence to become a mechanic; and it was expected by the teachers as well as the public that the pupil who went through the higher schools of learning would never become mechanics. For example, every bright farmer boy, or the gifted son of a mechanic, if he were to continue in the schools of higher learning, would be taken from the occupation of his father and be led into the ranks of the learned professions. According to Woodward, this loss of the best minds in the field of mechanics would be a great loss to society, for it created distinction between societies which should not exist at all in a democratic country. It also created false ideas of the various kinds of intellectual culture.

Up until this time, men had tried to cultivate only their minds, completely neglecting their hands; and those who had worked with their hands found no opportunity to cultivate their minds. It was in the Manual Training School that a combination of the hand and brain was started. In other words, the demand was for intellectual training
combined with manual training. It was the aim of the
Manual Training School to supply this need to the public
schools. 39

It was noted by many teachers that the students who
had received instruction in shop work could quickly grasp
definitions and geometrical constructions. For example,
there were many pieces of apparatus made in shop work to
illustrate different parts of the equipment of the physics
department. In teaching hydraulics, heat, light, elec-
tricity, et cetera, the instructors found shop-made
apparatus very useful. In any physics class the labora-
tory work is the key to its interest, and without manual
training the best part of laboratory work would be almost
impossible. The ability of a pupil to think out a piece
of apparatus and then make it up is very valuable to that
pupil. One can see, then, that science and mathematics
profit from a better understanding of forms, materials,
and processes which come about through manual training. 40

Manual training raises the standards of attainment
in the mechanical occupations. As Woodward stated, "man
became man when he made his first tool, and he becomes more


manly as he continues to invent and use more tools.\footnote{\textit{Ibid.}, p. 137.}

For example, to turn a crank is not a hard task to accomplish, but to devise and build the engine that will do the work of hundreds of men takes much intelligence and manual skill.

At the present time, much work is done by machinery that just a few years ago was done only by hand. Through a combination of intellectual training and correct tool manipulation, much manual labor is now being relieved. All occupations are becoming more profitable through the influence of thought and skill. Instead of man being taught to endure the drudgery of toil more cheerfully, he should be taught how to overcome toil by skill, thus raising a trade to the rank of a profession. For example, the profession of dentistry was developed from a trade to a profession through the use of scientific methods.

Woodward realized that only a small percentage of the students who attended the Manual Training School would become mechanics, for their aptitudes and opportunities would carry them into many different fields. But wherever they went more than likely they would come in contact with industrial work, and through the instruction they received at the Manual Training School, their influence on such industrial work would prove to be valuable to society.
Too often, there is little, if any, understanding between the employer and the employee; neither knows enough about the experience of the other to furnish a ground for common understanding. The Manual Training School helped to overcome this undesirable situation successfully by giving to the one with the scientific training a fair allowance of manual training; to the one with tool training it gave something of mathematics, science, et cetera. This was one of the outstanding features of the Manual Training School.

Through its broad curriculum, the Manual Training School was very successful in stimulating inventions. The so-called educated man rarely makes an invention, for he is too deficient in a knowledge of essential conditions; the practical mechanic seldom makes an invention because he is not well trained in the calculation of figures. By combining these two classes of men, one would have a well-educated man with much potential ability. In many of his writings Woodward stated specific examples of boys who had graduated from the Manual Training School making small inventions that proved to be successful. For these reasons it is easy to understand why the era of invention came about at the time of the rise of manual training in the United States.
Since the majority of the boys back in the early part of the nineteenth century upon graduation found themselves faced with the problem of making a living, the importance of the Manual Training School could not be stressed too greatly. It was discovered that the graduates of the Manual Training School were in such great demand by the various business establishments of the city that only half of those needed could be given employment. This demand was largely because the graduates of the Manual Training School were so trained that they could use both their brains and their hands.

Another outstanding value of the Manual Training School was that it gave sounder judgments of men and things, and of living issues. Many people thought Woodward to be prejudiced toward the values of the Manual Training School since he was the one who set it up, but many other teachers who were in daily contact with the students saw the same results. An evaluation, which would seem necessary at this point, will be given in the following chapter.

CHAPTER IV

THE LATER DEVELOPMENTS OF INDUSTRIAL ARTS

The term "industrial arts" as is used in this study is defined on page 5 and will be regarded as a phase of general education, described by Wilber as follows:

Industrial arts will be defined as those phases of general education which deal with industry--its organization, materials, occupations, processes, and products--and with the problems resulting from the industrial and technological nature of society.

This definition stresses the importance of industrial arts in public education and its relation to general education.

The early advocates of manual training thought of it as an area of learning that was designed to teach boys handwork as a part of their general education. This definition suggests the theory of formal discipline carried over into shop-work instruction. The term "manual training" has not become obsolete, but it has rapidly fallen into disuse within the last few years.

It is a well-known fact that the object of any educational system should be progressive in nature, yet studies

1Gordon O. Wilber, Industrial Arts in General Education, p. 2.
of past history reveal many conflicts in the public schools. With every new age in civilization there has come a new age in education. As Woodward stated, "educational progress has been first the effect of progress, and then the cause of more progress."\(^2\) In this statement Woodward emphasized the fact that the present state of affairs in educational matters was not essentially different from what it had been hundreds of times in the past when education was making a decided change in its growth.

The age out of which the manual training school developed was one of rapid progress in many different fields. In spite of these many changes and improvements, the field of education was the last to concede to the change. This was because there were too many Rip Van Winkles who stuck to the traditional ideas and did not want to recognize the changes around them. This same situation, in many cases, can still be found today in the public schools.

Before pointing out the absolute value of manual training in relation to its contribution to the present-day system of industrial arts, it is well to note the importance placed upon the use of terminology. The value of terminology does not lie in what a thing is called, but rather in the recognition of what a given term signifies. Much

confusion has resulted from the variety of terms used to designate handwork in the schools. This confusion is just as great among the teachers in the field as it is with the public. Because of the confusion and misunderstanding by administrators and the public, the manual training program has had, from the beginning, a never-ending struggle for existence.

Too often one hears the statement that it is not so important what is taught as how it is taught. Under this theory of education, special training for particular lines of work and special aptitudes of the students receive no consideration at all. It was not so long ago that pupils were required to memorize names of railway stations in their order, to recite a long list of historical dates, and to sing the names of the various states with their capitals. The justification given to this type of training was that such routines strengthened the mind and that the thing learned was more important than the way it was taught. There is no denying that there is much value in the proper methods of drill, but it should be maintained that there is also much value in the subject matter being presented. Had the above theory been true, manual training would have been doomed long ago for its aims were based upon the idea that what was taught was of supreme importance.3

One of the specific aims of manual training as stated by Friese is that it should provide opportunities for boys to make and do things they like to make and do. This aim deals with the principle of worthy use of leisure time. In other words, what might be recreation to a pupil today may become his vocation tomorrow. It serves as an outlet for the interests, desires, and hopes of a pupil and may later serve as a desirable need in adult life. As is well known, a proper balance between work and leisure time is a basic problem in everyday life. It is a common belief that if a pupil receives but an avocation from his experiences in manual training it would justify his time and effort. Many men, both in business and the professions, repair their automobiles and build various things, but few realize their reason for doing it.\(^4\) The reason lies in the fact they were allowed to do the things that they wanted to do. When explained in this manner, very few people will question the desirability of this type of activity in either adult or child life.

Another justification of manual training as voiced by Friese is that it should provide training in the common skills that everyone should possess. Very few will deny the desirability of a man's being "handy" with tools in his home. The tradesman who came from Europe to America several

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years ago had a very serious shortcoming. That is, he knew one particular trade exceedingly well and would not use his skillful hands for any other thing. This is still true today in many walks of life. In carrying out the above aim of manual training, the courses are designed so as to meet a recognized need of the boy. For example, it is well for a boy who will probably establish a home later on in life to know what is necessary for the upkeep of that house and possibly the maintenance of an automobile.\textsuperscript{5}

Fries also would provide exploratory or tryout experiences in trade training in the manual training program. This objective deals with pupils exploring their own capacities and interests and surveying the different types of work that might assist them in the selection of a vocation. These trade explorations given in the early manual training schools were usually organized in one of three different types of shops. The first shop may be typical of a large group of occupations. The second type of shop was one that was general in nature. The third type was of a nature where the boy might get experiences in sheet-metal work, machine shop, forging, et cetera, all in one metal-working shop. The purpose of these explorations was to reveal to the boy either general or specific attitudes. It was believed that if the resulting interests of boys

\textsuperscript{5}Ibid., p. 43.
were either decreased or increased by this trade exploration, the exploratory aim of that subject had been achieved. 6

Another aim of manual training as set up by Friese is to provide training in industrial art and industrial art appreciation. Art, as used in this case, applies to utilitarian objects in daily contact rather than the so-called fine arts. For this reason, the above aim contributes to worthy home membership, which is one of the objectives of education. The underlying reason for this aim is to produce students who will become consumers of beautiful things rather than producers alone. In other words, it contributes to the education of all. 7

It was also believed by Friese that a natural medium for guidance, both educational and vocational, should be provided in the manual training program. In vocational guidance it is necessary to establish a broad background of intelligent information about many occupations. According to the philosophy of Friese, educational guidance needs, for a prerequisite, this occupational intelligence which is obtained in the manual training program. 8

To provide technical information, according to Friese, is another aim that should not be overlooked. This operation endeavors to produce intelligent individuals who will

6 Ibid., p. 44.  7 Ibid., p. 45.  8 Ibid., p. 46.
develop a curiosity and an inquiring mind through their attempts to find the why, what, and how of mechanics.

The underlying philosophy of this objective is that it is better to teach the principle behind the inside construction of a micrometer along with its proper use than just to teach how to read it. This broad occupational intelligence, as implied by Friese, is an essential factor in the process of a man's finding his best ability in an occupation.9

The establishment of organized training and problem solving which made it possible for the student to find his best chances of success in a vocation, is one of the outstanding aims of the manual training program, as interpreted by Friese. This objective deals with both subject matter and method. It is believed that unless a boy can learn how to arrive at new conclusions, on the basis of his past experiences and knowledge, he is losing one of the chief benefits that can be obtained from manual training instruction. Through its achievements, this aim helps to express criticism of modern education; that is, while students may learn many valuable facts, they often fail to learn how to approach and solve new problems. Manual training provides an excellent medium for this type of instruction, though it is not recognized as being an end within itself.10

9Ibid., p. 47. 10Ibid., p. 48.
Having thus far discussed the aims of manual training as set up by Friese, it would be well to list the objectives of industrial arts as shown by Wilber. Some of the important objectives of the present-day system of industrial arts are as follows:

To explore industry and American industrial civilization in terms of its organization, raw materials, processes, and operations, products, and occupations.
To develop recreational and avocational activities in the area of constructive work.
To increase an appreciation for good craftsmanship and design, both in the products of modern industry and in artifacts from the material cultures of the past.
To increase consumer knowledge to a point where students can select, buy, use, and maintain the products of industry intelligently.
To provide information about, and—infsofar as possible—experiences in, the basic processes of many industries, in order that students may be more competent to choose a future vocation.
To encourage creative expression in terms of industrial materials.
To develop desirable social relationships, such as cooperation, tolerance, leadership, and followership, as well as tact.
To develop a certain amount of skill in a number of basic industrial processes.\[1\]

According to Wilber, the objectives of industrial arts should indicate behavior changes which are really the desired end of any subject. That is, when a student finishes a course his behavior should be different from what it was at the beginning of the course. For example, since aesthetic appreciation is an accepted aim of industrial arts,

\[\text{\[1\] Wilber, op. cit., pp. 42-43.}\]
then the student who has studied various designs in ceramics should behave differently when he enters a house which has a beautiful vase on a table. He looks at the vase in a different way and may want to examine it more closely. Through these reactions an indication of learning has been revealed.

To further clarify the objectives thus far given, a list of the aims of industrial arts as described by Vaughn and Mays is quoted, as follows:

To supply the psychological demand for motor activity during the "emotional-volitional" period, or the period in which the instincts are dominant.
To give such an abundance of experience with objects, materials, and fundamental activities as will furnish a broad basis for associative judgment and guides to conduct, and at the same time leave a kind of residue of deposit of habitual reactions.
To serve as an energizing means or method of presenting the other subjects of the curriculum.
To assure the early establishment of the idea of the nature, necessity, and importance of work.
To meet in a constructive and satisfying way these compelling interests of boy nature. These, of course, furnish the key to much of their work.
To furnish some information and training that will function directly in the pupil's relations and obligations to the home.
To give the pupils a more definite, a more discriminating, and a more comprehensive understanding of their industrial environment and its contribution to the completeness of their general environment.
To give an appreciation from the consumer's standpoint, of the work, the methods, and the products of industry, especially as they relate to and involve the essential principles of art, design, and workmanship.
To prompt and to guide those first considerations of occupations as possible lines for their life work.12

While Wilber refers to industrial arts as those phases of general education which are unlimited in number, such as the ones that deal with industry, Vaughn and Mays limit industrial arts to handwork and manual training in the elementary school and shop activities in the high school. Although there are many phases of general education that would come under industrial arts, they would not necessarily have to take place in the shops, as is emphasized by Vaughn and Mays.

Vaughn and Mays are more specific than Wilber in pointing out that industrial arts is not designed so as to prepare students for vocations. Wilber's definition seems to limit industrial arts primarily to the educative processes of general education, but Vaughn's and May's interpretation could be taken to mean that industrial arts includes creative and recreative learning as well as other types of learning.

To further elaborate on the claims of manual training, Love set up a list of objectives to justify the question, "upon what grounds is the claim made for the introduction of manual training into our schools?" These objectives are as follows:

It is believed that it ranks in importance with the study of numbers or language in the benefits it confers on its recipients. By training the eye and

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hand we educate; it is manual work that appeals to these in a most persistent manner.

It claims positive usefulness. The belief is becoming widely spread, that any system of education that does not have for its object in some degree the self-sustaining of the recipient, that does not aid him in becoming a producer, is radically defective.

It gives a feeling of independence of character to the pupil. Wendell Phillips says: 'The best education in the world is that got by struggling to get a living.'

Human beings were meant to employ their muscular powers. The earlier they begin to experiment with the physical world, the better hold do they have for life, with the more serviceable value to themselves and others.

Children love activity. The great majority of children and youth prefer to do something, go on errands, do some kind of work that is pleasant, agreeable, to the drudgery of study, or trying to obtain useful information from a book. The life of a student is not natural to them, and notwithstanding the best and most wisely directed efforts of the best instructors, they will give up efforts in that direction, when once free from the restraints of the schoolroom. They don't expect to live by study. They don't want to, and they will not. They do expect to work, and if they were early and wisely trained to use their powers in learning to do a great variety of things, it would help them materially in the high road to a good living and aid their aspirations for success.

Children are born to be doers rather than learners of book knowledge. So we say with a due degree of reserve and modesty, that the manual arts mingled with the study of books and things, suggest a reform much needed, and which should be introduced all through our schools at no distant day.

At home the child is trained in doing. The movements of a child, with the body, the hands, the eyes, are at first without meaning, mechanical, emotional, more or less unconscious; but by experience and training, they become intellectual, more or less under the direction of the mind.

The school should continue what is begun in the home. A young man who knows his powers for work with his hands, who has been trained more or less in the manual arts in addition to intellectual culture, has a decided advantage over those who have not; and why not in the name of human progress give it to him in the school, as the chances are that he will get it nowhere else.
Very many children dislike books. Now suppose that all our children and youth, male and female, were trained in the manual arts according to their circumstances and capacities, the same as they are now in the languages and mathematics, would not many of the harmful features of society be remedied, and the world be the better for it?

There is a growing distrust of the methods of the public schools. The difference between the study of books and learning the manual arts is just this: with the former, after the work of committing to memory, comes the examination, during which we undertake to determine, by questions not always legitimate, the contents of his storehouse of learning; the result is not satisfactory to either teacher or pupil, because the interest being gone, the memory fails to retain all or nearly all that is beyond his years and experience. But training in the manual arts being actual experiences, they remain in the mind for suitable digestion and assimilation.

It is said that our schools promote laziness. Under the present state of things, if a young man finds himself without a disposition to work he enters upon one of the professions, and so the ranks of statesmen, lawyers, doctors and preachers are freely and constantly replenished with weak and inefficient men.

Manual training promotes human progress and happiness. A course of study to which manual training is added, the enlightened educator will find to be more practical and healthful than the usual one that demands book work only.\footnote{Ibid., pp. 1-13.}

In reviewing the aims of both manual training and industrial arts, it can be clearly seen that neither have produced definitely vocational skill. However, it is true that the early teachers of manual training and also some of the recent ones, looked upon skill of hand as the main end for the work, but they did not believe it to be training for definite vocations. These early teachers also held to the doctrine of the transfer of skills and therefore placed much emphasis upon the acquisition of skill of hand, but they did
not believe that the training of carpenters and mechanics was the primary purpose of their work.

Because of insufficient time allowed for shop work, and the fact that the teachers themselves did not have enough trade experience to enable them to give the work a vocational character, the purpose of manual training could not have been to produce skilled mechanics. Therefore, the people who advocated manual training or industrial arts disclaimed any intention of teaching vocations.

Manual training had a very beneficial effect upon the curriculum of the schools which were, at that time, very "bookish" in nature. It also provided a general industrial training as an aid to meeting the demands of the new age known as the "machine age". Some of the desirable influences manual training has exerted upon the educational system, as listed by Struck, are as follows:

- It has helped to introduce interest into the curriculum by emphasizing life problems. It has helped to change our schools from "learning" schools to "life" schools.
- Greater opportunity, than formerly existed, was given to creative thought on the part of pupils, thus stimulating the development of originality and initiative in learners.
- Greater freedom of thought, of expression, of school discipline and of attitude of pupils to teacher resulted from the new venture in education. Both teachers and pupils were made more free from old traditional bonds of restraint that governed classroom procedure.
- Manual training provided some exploratory, self-discovery opportunities for pupils. It gave them
some, though often but a limited, appreciation of how men labored in various great industrial enterprises.15

From these early forms of manual training has gradually evolved an enriched and enlarged subject that has become widely known as industrial arts. It is not an easy task to arrive at a decision as to whether "industrial" or "manual" is the more desirable term to associate with "arts." If one were to search for a definition of the two terms in a good dictionary, the results would be very confusing. It is a generally known fact that the word "manual" has reference to something that is done with the hands. Indirectly speaking, it means the accomplishment of a task through the use of simple hand tools rather than that of machinery. Yet with the twentieth century came the great expansion in the use of machines which supplemented the work in the manual training shops. This marked the beginning of the change in the use of the term "manual arts" to that of "industrial arts."

From the standpoint of progressive thinking, industrial arts has much significant subject matter and many various types of methods adaptable to the accomplishment of integration, which is, at the present time, the major movement in education. It contains both physical and mental content which is the dominant type of American life and also

holds the greatest interest in everyday activities. It is this wide scope of content that has caused industrial arts to become so popular in the eyes of educated people.

It is well to note that industrial arts also has a great economic value to society. Some of these economic values as listed by Struck are as follows:

1. Conserves human effort
2. Conserves natural resources
3. Saves wear and tear
4. Increases skill
5. Added trade interest
6. More continuous employment

Within the last few years social and economic conditions have so changed that many learning activities have been eliminated from the home and placed in the public schools. It is now the task of the schools to furnish, as far as possible, these valuable learning activities. It is now becoming recognized that these activities can best be supplied through the broad and enriched field of industrial arts which evolved from the manual training schools set up in the latter part of the nineteenth century.

From the preceding paragraphs it may be concluded that industrial arts, as it is recognized and understood today, is intended to contribute to the general, all-around development of the individual.

16Ibid., pp. 70-74.
CHAPTER V

SUMMARY

Although Woodward held many different positions in his lifetime he accomplished his most important work as originator and director of the St. Louis Manual Training School, which opened in 1880 under the direction of Washington University. Since this was the first school of this nature to be set up in the United States, Woodward's success with the school was accompanied with much hard work. However, he did prove the importance of manual training as a part of general education through the St. Louis Manual Training School.

It would be well to note that the Philadelphia Centennial Exposition of 1876, which presented a clear and definite picture of the methods used in the Russian system of tool instruction as set up by Victor Della Vos, had much influence on Woodward in that he was made to realize a way in which shop work could be taught as a part of general education. However, the Russian system itself was not designed for the purpose of teaching shop work as a part of general education; contrary to the popular belief that it was general in nature, it was actually
set up as a more economical and more effective school substitute for apprenticeship.

The Manual Training School, as set up in 1880, was strictly a pioneer school. In organizing the curriculum of the St. Louis Manual Training School, Woodward did not think in terms of future occupations so much as in terms of general preparation for life. That is, he wanted to teach the boy the things in which he was interested instead of teaching the things that were thought to be necessary through tradition.

It cannot be stressed too greatly nor too often that the object of the shop work presented in the St. Louis Manual Training School, as a part of general education, was not to teach a boy a trade but to develop his facilities— that is, to help the child discover his abilities and limitations along the line of tools, materials, processes and procedures. From this it can easily be seen that the Manual Training School represented a broader type of education which put the whole boy to school rather than just part of him. It is also evident that the school provided a boy with physical activity and growth as well as mental activity and growth; the combination of both being greater than either taught alone.

Although Woodward was a strong advocate of introducing manual training into the public school curriculum, he did
not think of it as the only type of education to be presented to the pupil. He believed that the combination of manual training with the academic subjects would be like combining the hand and the mind. Through this combination, the boy would receive those essential experiences which deal with the problems and duties of everyday life. In other words, through the introduction of manual training, a broader and more general type of education could be presented to the boy and thus enable him to face the world in reality rather than in dreams, which was the ultimate goal of the manual training school.

The effectiveness of the Manual Training School set up by Woodward in 1880 was shown through the unusual attendance of the boys in that school. The introduction of manual training enabled the boy to do the things which interested him and thus cause him to remain longer in school. So it is logical to assume that when a school is found interesting and attractive a boy will come and stay.

Through a study of the aims of manual training as set up by its early advocates and the objectives of the present-day system of industrial arts, it was found that neither had, in the main, produced vocational skills. However, manual training, as set up in the beginning, looked upon skill of hand as its ultimate goal, but not for the purpose of producing a definite vocation. In other words, the
primary purpose of manual training was not to produce carpenters and mechanics, as was the belief of many people at that time; it was to familiarize the child with the different tools, materials, and processes and to teach the hand and eye to work together.

The success which has accompanied the element of manual training in the public schools is an excellent indication of the soundness of the underlying principles upon which it was organized from the very beginning. While out of these early forms of manual training there has evolved a broader and more enriched field that has become widely known as industrial arts, the basic ideas as were determined in the St. Louis Manual Training School set up by Woodward are principally the same as the ones given to the field of industrial arts. From this, it is evident that the present-day system of industrial arts has been greatly influenced by the St. Louis Manual Training School as set up by Woodward in the latter part of the nineteenth century.
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