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ABSTRACT

The author has presented a historical review of societal/industrial conditions affecting the development of manual education to determine if a need for change in industrial arts exists at the present time. Societal conditions, industrial conditions, and the resulting educational response are examined in: Russia (mid-19th century), Sweden (19th century), England (19th century), America (mid-19th century to 1920), and America (present time). In Russia, the 1861 emancipation resulted in freed, untrained peasants, who formed the basis of the working force required for industrial development. The introduction of Sloyd (a system of handwork or manual training in Scandinavian countries) in Sweden was more an attempt to revitalize a society than to produce skilled workers. In England, the Arts and Crafts Movement was a protest against the dehumanization of workers. Decay of the apprenticeship system in America necessitated the development of manual training. As dissatisfaction with manual training became apparent, industrial arts, aimed at helping students understand industrial processes and materials, appeared on the scene. Industrial arts is still making use of general shop today as it did in the 1920's. The author contends, in light of the data collected, that a need for change in industrial arts currently exists. (EA)

THE NEED FOR CHANGE IN INDUSTRIAL ARTS BASED ON SOCIETAL AND INDUSTRIAL CONDITIONS

by

Owen J. Barry

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Science

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Without the understanding and co-operation of my family, the time necessary to complete this thesis could never have been found. In addition, my appreciation is expressed to my wife for undertaking and completing the task of typing this paper in such a competent manner.

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Chapter 1

STATEMENT OF THE PROBLEM

The purpose of this study is to explore the hypothesis that developments of various forms of manual education have occurred in response to needs that developed because of changes in societal and/or industrial conditions, and to compare the relationship of conditions within contemporary society and industry with those existing at the time of the introduction of industrial arts into the public school system, to determine if a need for change in industrial arts, as it relates to societal and industrial conditions exists at the present time.

BACKGROUND AND SIGNIFICANCE

There exists at the present time concern as to what is being taught as against what ought to be taught in industrial arts.

Innovative programs in industrial arts generally have a rationale based on a study of technology, industry, or both. This is illustrated by Devore who relates his program to technology;[1] Kirby who bases his program on industry,[2] and Maley who bases his

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[1]Paul W. Devore, "Man and Technology," Occupational Education, 1:2, 1969.

[2]Jack Kirby, "Industriology: A Bid to 'Teach It Like It Is'," School Shop, 28:44-45, 1968.

program on a combination of industry and technology.[1]

The development of these innovative programs indicates that there is concern for the aims and objectives of the current traditional industrial arts programs.

Historically, at the time Della Vos set up the Russian System of manual education there was a particular need existing within that country.[2]

Both Sloyd[3] and the Arts and Crafts Movement[4] can be traced to needs which had developed in Sweden and England at that time.

Runkle and Woodward knew of a need when they adapted the Russian System to form a basis for the manual training programs in America.[5]

Dewey's philosophy that education is life and not merely a preparation for it,[6] leads to the reflection that life has changed since Bonser defined industrial arts.[7]

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[1]Donald W. Maley, "Industrial Arts - A Study of Industry and Technology for Contemporary Man," Industrial Arts and Technology - Past, Present, and Future, Addresses and Proceedings, American Industrial Arts Association, 29th Annual Convention, 1967, p. 5.

[2]Charles Alpheus Bennett, History of Manual and Industrial Education 1870 to 1917 (Peoria, Illinois: The Manual Arts Press, 1937).

[3]Otto Salomon, The Theory of Educational Sloyd, rev. and ed. by An Inspector of Schools (Boston: Silver, Burdett & Co., 1896).

[4]Oscar Lovell Triggs, Chapters in the History of the Arts and Crafts Movement (Chicago: The Bohemia Guild of the Industrial Art League, 1902).

[5]William Bawden, Leaders in Industrial Education (Milwaukee: The Bruce Publishing Company, 1950), pp. 8 and 70.

[6]John Blewett, ed., John Dewey His Thought and Influence (New York: Fordham University Press, 1960).

[7]Frederick G. Bonser and Lois Coffey Mossman, Industrial Arts for Elementary Schools (New York: The Macmillan Company, 1936).

The significance of this study is in the establishment of a relationship between societal conditions and industrial conditions, and the particular educational response of the time in regard to some form of manual education.

DELIMITATIONS OF THE STUDY

The concept of this study is such that it could include all countries that have at any time been involved with any form of manual education in their educational system. It is necessary, due to restrictions of time, to limit the countries and periods to be studied to the following:

Country	Date
Russia	mid 19th century
Sweden	19th century
England	19th century
America	mid 19th century to 1920
America	the present time

The particular systems and time periods have been selected because they are generally recognized as having an important impact on the development of industrial arts in the United States of America.

There are other factors which influenced the growth of industrial arts, e.g. the development of educational psychology, philosophy, physical and political factors, but the time element restricts the depth of study and precludes the inclusion of these relationships.

RESEARCH GOALS

1. To consider societal and industrial conditions in the following countries at the dates indicated:

Country	Date
Russia	mid 19th century
Sweden	19th century
England	19th century
America	mid 19th century to 1920
America	the present time

2. To establish a relationship between the educational response and the societal and industrial conditions for each of the countries reviewed.

3. To investigate the industrial and societal conditions existing at the present time.

4. To determine whether or not changes have occurred in present societal and industrial conditions which suggest that needs have changed since the introduction of industrial arts.

LIMITATIONS OF THE STUDY

The limitation of time and the restriction of travel, coupled with an inability to read foreign languages, namely Russian and Swedish, necessitated in the study of these two countries, the use of secondary sources printed in English.

A further complicating feature was the impossibility of completely covering the full extent and the numerous variations occurring

within society and industry at any one period of time in any country. As changes did not occur simultaneously in all parts of a country, there was a considerable period of time during which the conditions existing before and after the changes could usually be identified as operating in some part of the country. The staggered nature of change made it necessary to develop a general outline of conditions applicable to that era, but not necessarily true for every sector of the country.

DEFINITION OF TERMS

For common understanding and clarity of purpose, the following terms have been defined for use in this study:

Societal Conditions

The words "societal" and "conditions" could be defined as separate terms, but here they are intended to form a unity.

> Societal conditions. Those conditions under which "the social action of individuals and groups as they are involved in the structural - functional, the organizational and operational aspects of a human community or society"[1] occur.

Industrialization

Industrialization refers to the growth of industry as understood by the following concept:

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[1]The section in quotation marks is defined by J. O. Hertzler as "societal."

J. O. Hertzler, Society in Action (New York: Dryden Press, 1954), p. 6n, cited by Julius Gould and William L. Kolb, eds., A Dictionary of the Social Sciences (New York: The Free Press, 1965), p. 673.

Industry. An institution in our society which intending to make a monetary profit, applies knowledge and utilizes natural and human resources to produce goods and services to meet the needs of man.[1]

Educational Response

This term is used to denote a form of manual education which became significant in terms of the development of industrial arts.

PROCEDURE ADOPTED

In seeking to develop a relationship between societal conditions, industrial conditions and the resulting educational response it was necessary to conduct searches in the three separate fields.

The method used for each division of the study was the same and consisted basically of a search of the various library retrieval systems and a review of literature as it was identified.

The card catalog proved useful in obtaining lists of books relating to societal conditions and industrial development for each country and period under review. As books were located and categorised they were searched for acknowledgments and bibliographies which might lead to other relevant works. This procedure relating to bibliographies was applied to all works considered as having value. References unavailable through the University of Wisconsin-Stout Library were ordered through inter-library loan. This applied particularly to the study of Sweden. In this case the Wilson Library at

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[1]Orville Nelson, "The American Industry Evaluation System," Journal of Industrial Teacher Education, 6:37, Winter, 1969.

the University of Minnesota became the source for the identification of suitable literature.

Of particular usefulness in identifying the educational response of that time was Bennett's History of Manual and Industrial Education 1870-1917. Many references were obtained through his source materials and source references. The Yearbooks of the American Industrial Arts Association proved to be another useful bibliographic resource, as were the reports on proceedings of the National Education Association meetings from 1893.

Manual and computer searches of the ERIC system were conducted and included Research in Education, Abstracts of Instructional Materials, and Abstracts of Research Material, as well as Current Index to Journals of Education.

Abstracts of Research in Industrial and Technical Education by Jeldon provided a means of identifying doctoral dissertations. While the search of these abstracts was somewhat slow in itself, it was possible by using cross indexing to eliminate a large proportion of irrelevant titles. A difficulty arising from the search of these abstracts was that few of them were readily available and necessitated a further search to determine the micro film numbers to facilitate ordering.

A number of indexes were perused. These included Education Index, 19th Century Readers' Guide to Periodic Literature, Industrial Arts Index 1920 to 1957, Applied Science and Technology Index and International Index to Periodicals.

Possible relevant Masters' Theses in the University of Wisconsin-Stout Library were located by means of the computer print-out, K.W.O.C. Another computer print-out which was useful was the Periodical Index. Here the subject index was consulted to identify potentially useful periodicals. The list obtained was then compared to those periodicals identified through the Education Index and the C.I.J.E. and those that were previously noted were eliminated to save unnecessary repetitive searching.

U.S.Government Publications, Monthly Catalog from 1929 to 1974 was scrutinised to isolate government documents pertinent to the study.

As literature was gathered for each phase of the study, a general picture of the societal and industrial conditions of that time was developed by synthesizing information obtained, and the related educational response identified.

Statistics taken from various sources, particularly those prior to 1900 showed discrepancies in the absolute values quoted. Where possible, figures were compared to other sources to determine if similar trends were evident. The trends indicated by statistical figures were the important aspects to be considered. For example, it mattered little if there were discrepancies between two sources of absolute numerical values, provided each source indicated a similar type trend.

Tabulated statistical data were abstracted from printed materials and acknowledgments found to be necessary were accorded in the footnotes.

Chapter 2

This chapter will contain the main body of the thesis which consists of a study of Russia, mid 19th century; Sweden, 19th century; England, 19th century; America, mid 19th century to 1920 and finally America at the present time.

Where applicable, trends of various features will be illustrated graphically in an endeavor to develop an overall feeling for conditions existing at the time.

RUSSIA - MID 19TH CENTURY

Introduction

In this study of Russia which covers the period between 1820 and 1870, consideration will be given to societal conditions, industrialization and an educational response. There will be developed an overall picture of conditions and related influences pertaining to these areas at the time under review. As well, details of the principal features of the particular educational response being considered will be included.

The statistics examined for Russia during the 19th century showed little agreement in terms of absolute numerical values. There was, however, agreement in relation to trends exhibited in the various situations considered.

It should be emphasised when speaking of a country of the size and complexity of Russia that statements must be generalized as

conditions could, and did, vary considerably from one area to another.

Societal Conditions

The population of Russia at the middle of the 19th century was ninety five per cent rural.

There existed a class system, consisting in the main of:

nobles - who were landowners

merchants - generally the business men in the cities

freemen - who were free to make decisions for themselves and generally formed the hired labor group

serfs (divided into two classes) - those "owned" by the landowning nobles (possessional) and those "owned" by the State.

The serfs were by far the most populous group. They had, in theory, some rights but in practice these rights were almost non existent. For example, if a serf wanted to buy land he had to have the master's permission. The master could demand that the serf show him the means by which he could make this purchase, and then by virtue of the rights held as the master, he could take the money from the serf. The master was the source of authority. He could sell his land and the serfs with it. The serfs had no way of taking "legal" action against their masters.

This system persisted up to 1861. In February, 1861 Alexander II introduced emancipation for the serfs. Again they obtained more in theory than in actual practice. Part of the emancipation was that the serfs were to receive allotments of land, but very often this was the poorest quality land and quite insufficient to maintain a man and his family. Access to water was frequently the

source of disputes. Numbers of peasants left their plots and looked for other forms of work. The outcome of this was that there were many peasants who could be hired to work in factories. This added greatly to the numbers of uneducated and unskilled people seeking employment in the factories and with less than one per cent of the population being educated, the factories were experiencing difficulties with the quality of labor. The main factors that emerged at that time were that labor was cheap and free labor proved more successful than did the forced labor; even so, it was not uncommon for a rich land-owner to also have factories and to transfer 'his' serfs to work in the factory when it suited his work requirements.

Industrialization

Industrialization had commenced during the 18th century during the rule of Peter I. Production of pig iron at the beginning of the 19th century has been variously rated as highest in the world and third highest. This in itself is of little importance, the point being that Russia, a supposedly un-enlightened country was able to be among the top pig iron producers at the turn of the 19th century. Production did, however, slump very badly by the middle of the 19th century and had a low rating both in terms of tonnage produced and position among the world's producers. As always with situations of this type, the reasons can be complex and it seems that the lack of a transport system, such as a railway, and the failure of the industry to improve its techniques, brought about the availability of a cheap form of labor, were contributing factors to the non-progression of the pig iron industry.

There was a slow, but steady increase in the number of factories during the 19th century. This is shown in Figure 1. The figures quoted on the graph are from The Dictionary of Statistics and are somewhat suspect as absolute values. It does seem that in Russia up to approximately 1880 at least, that official sources of statistics are unreliable.

There are usually complex and varied reasons for the unreliability of figures and in this particular case these would be: the lack of a reliable authoritative structure to collect the information; the desire of some factory owners not to "declare" their factories; the failure to define what each classification includes and the division of authority between separate government bodies. However, it is not the absolute values which are of interest, but rather the general trend.

The Soviet historian Zlotnikov applied Lenin's definition to "factory" and so limited it to those employing sixteen persons or over. He then included metallurgical industries and determined his estimates for the periods 1804 and the 1850's.[1] His figures, while not exactly the same as those shown in Mulhall's Dictionary of Statistics, do in general, support the trend as shown in the graph, Figure 1, for the period previously mentioned.

Even though there was a doubling of factories in approximately the first fifty years of the 19th century, the total value of

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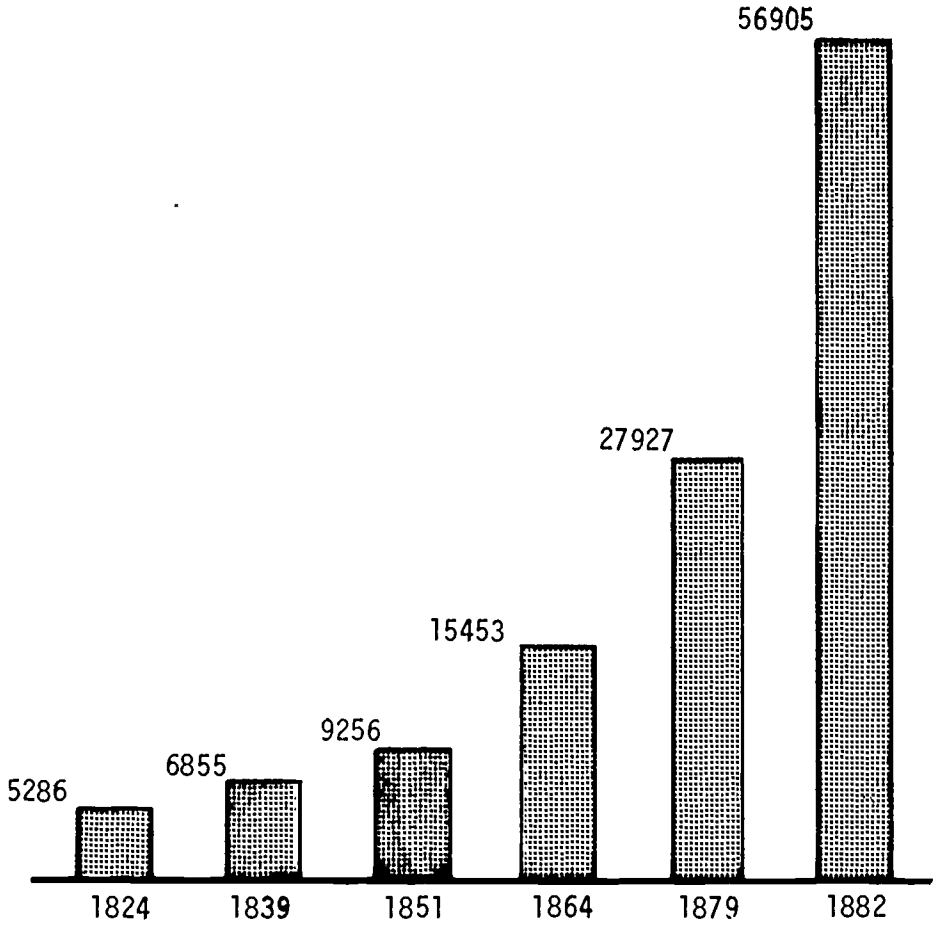
[1]William L. Blackwell, The Beginnings of Russian Industrialization 1800-1860 (Princeton, New Jersey: Princeton University Press, 1968), p. 42.

Figure 1

Number of Factories, 1824 to 1882



Source

Michael G. Mulhall, The Dictionary of Statistics (London: George Routledge & Sons Ltd., 1889; rpt. Detroit: Gale Research Company Book Tower, 1969), p. 373.

production was worth less than ten per cent of the basically agrarian economy.[1]

The significant event of the 19th century was the official announcement of emancipation in 1861. Up until this time factory owners had been able to "buy" whole villages of serfs. Laws were introduced in an attempt to abolish this practice, but the factory owners circumvented these laws by hiring instead of buying the village, which in practice amounted to the same thing. In the iron and steel industries which had made great use of forced labor, there was a large exodus of workers at the time of emancipation. Those industries which had not prepared themselves for the situation and had relied heavily on forced labor suffered badly, with some being forced to close.

It appears that, in general, the factory owners themselves preferred hired labor to the forced labor. They found that the hired labor was more reliable and less trouble in handling.

Another facet of the social conditions before 1861 was that a serf was able, under certain conditions to buy his freedom and become a freeman. In many instances where serfs worked in factories, learned skills and became freemen, they returned to their village, and because of the rudimentary equipment required, set up business within their own houses. This led to a situation where a factory owner would provide the raw materials and the freeman would carry out the necessary

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[1]Blackwell, p. 42.

work and then sell the produce back to the factory owner. The owner, thus had a business operating without necessarily having it operate within a factory building.

Conditions within many factories were extremely bad and exhibited all the horrors that England went through in the initial stages of industrialization. In Readings in Russian Civilization, there is an account of factory life and conditions in the 1800's.[1]

When the ban on the exportation of English machinery was lifted, entrepreneurs from England set about capitalizing on their technical skills. From 1842-1860 some of the largest factories in the world were located in the suburbs of big cities in Russia.

Backyard technology and the use of servile labor have been given as reasons for the backwardness of the woollen cloth manufacturing industry.

Beet sugar refining developed during the early 19th century and by the 1850's production was 4,500 tons of sugar annually.

Production of agricultural products during the first half of the 19th century remained comparable with the acres under cultivation. This suggests that in the early part of the 19th century there was little or no move towards mechanization of the rural industries.

Indications are that industrialization in Russia did not gather momentum until after the emancipation of the serfs. Conditions of

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[1]Thomas Riha, ed., "Industrial Workers in the 1880's," Readings in Russian Civilization, Vol. II, Imperial Russia 1700-1917 (Chicago: The University of Chicago Press, 1969), pp. 409-415.

growth within the industry even then were cyclic and subject to times of good production and depressed conditions. Also in the second half of the 19th century much use was made of foreign capital and technical knowledge in the establishment of industries and there occurred also the growth of a railway system. All this called for skilled labor which was not available.

In general, the population of Russia at the time of the emancipation was basically rural in nature and this in itself was not conducive to the setting up of industries requiring skilled workers.

An Educational Response - The Russian System

Education in Russia was quite limited and it has been estimated that less than one per cent of the population was receiving some form of education. In 1830 in Moscow there was established a School of Trades and Industry. It contained workshops which contracted for work on a competitive basis. During the reforms of the 1860's this school was reorganized and renamed the Imperial Technical School. It concentrated on developing skills to be used in trades and was not concerned with the concept of general education.

The system of 'training' practised in the factories depended upon the observation powers of the apprentice - he was not shown, but rather had to observe others as best he could and then practise whenever he was fortunate enough to be allowed to use tools.

> Up to the present time throughout the world, the workmen at industrial works and mills are usually self-taught. Anyone who has himself been employed at a works and is familiar with the daily life of the workman in the different countries,

> must have perceived that the acquirement of knowledge and skill in any trade, is to him a process much similar to the following: A boy of thirteen or fourteen years of age, having entered a mechanical works to learn his trade, is put during the first few years to work of an entirely unproductive kind and which has not the slightest relation to technics. He is made to carry water, sweep the workshop, crush emery, grind colors, etc. Only after the lapse of a few years and, probably, thanks to accidental circumstances a chisel or a file is put into the hands of the youth and he is set to perform the rudest and simplest kind of work.[1]

The above quotation indicates that undesirable situations developed from this practice. The worker by concentrating on one particular area of skill developed expertise essential for efficiency only in that particular area. This however, was not satisfactory in a situation where the demand was for workers whose capabilities extended beyond specialization. For example, the skilled operator was of no use in repairing machinery in the event of mechanical breakdown. Industry in its initial stages of development required personnel with versatility of skills rather than the highly trained specialist.

Della Vos and his associates at the Imperial Technical School were aware that a system of training was required and the following were basic aims in developing their method of instruction:

(1) to have the students acquire skills in the least possible time.

(2) to allow for instruction to be given to a large number of students.

(3) to impart a sound systematic approach to practical work.

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[1]Charles Alpheus Bennett, History of Manual and Industrial Education 1870 to 1917 (Peoria, Illinois: The Manual Arts Press, 1937), p. 48.

(4) to be able to demonstrate the progress of the students at any time.[1]

The general principles of the system were as follows:

1. Each art or distinct type of work has its own separate instruction shop; e.g., joinery, wood turning, blacksmithing, locksmithing, etc.

2. Each shop is equipped with as many working places and sets of tools as there are pupils to receive instruction at one time.

3. The courses of models are arranged according to the increasing difficulty of the exercises involved, and must be given to the pupils in strict succession as arranged.

4. All models are made from drawings. Copies of each drawing are supplied in sufficient number to provide one for each member of a class. The drawings are mounted on cardboard (or, for the blacksmith shop, on wooden boards) and varnished.

5. The drawings are made by the pupils in the class for elementary drawing, under the direction of the teacher of drawing with whom the manager of the shops comes to an agreement concerning the various details.

6. No pupil is allowed to begin a new model until he has acceptably completed the previous model in the course. He must receive at least a grade of three, which is considered good.

7. First exercises will be accepted if dimensions are no more than approximately correct; later exercises should be exactly to dimensions; therefore, the same marks given a student at different periods during course do not express the absolute, but the relative, qualities of his different pieces of work.

8. Every teacher must have more knowledge of his speciality than is necessary merely to perform the exercises in the course of instruction. He must keep constantly in practice so that his work may be an example of perfection to his pupils. Such dexterity increases the authority of the teacher.[2]

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[1]Bennett, History of Manual and Industrial Education 1870-1917, p. 16.

[2]Bennett, History of Manual and Industrial Education 1870-1917, pp. 17-18.

It is interesting to note that each student received a "basic" but not "complete" set of tools and was responsible for locking these tools in the locker provided for his use. The extra tools were available on a common use basis and were kept in a numbered position on a display board. Again each student had the responsibility of returning any tool he used to its correct position.

Sample boards, tool display boards, the rules of the shop, as well as the daily work program were displayed within the shop.

The importance of Della Vos's contribution lies in the fact that it was the first system in modern times which analysed the basic skills and organized a set of exercises intended to develop the level of performance of the students by progressively introducing more complicated tasks, each level depending on the successful completion of the previous stage. The approval of the instructor was required before the students undertook the next exercise.

The instructor was required to ensure that there was adequate material for the day's program and after the demonstration would move about helping individuals as they worked at their respective places.

Summary

The emancipation of the serfs in 1861 theoretically placed them in a position where they were able to work their own plots of ground. In practice, however, it often occurred that the land received was not capable of supporting them and many were forced to leave the land and seek employment elsewhere. The displacement of these serfs created the free workers that were necessary to form an

effective work force for the developing industries. However, the serfs' traditions of rural employment did not fit them as industrial workers and it was into this situation that Della Vos introduced his system of manual education.

This system, later to be known as "The Russian System", was technical in nature and aimed at efficiently and systematically developing skills which would be applicable in the industrial situation. This development was to be achieved through a set of graded exercises, each to be attempted only after the satisfactory completion of the preceding one.

Della Vos also insisted that the training shop should be separated from the workshop.

The educational system developed out of needs identified as the existence of an inefficient instructional method and the requirements of industry for numbers of skilled workers.

SWEDEN - 19TH CENTURY

Introduction

This study of Sweden covers the major part of the 19th century. Its purpose is to provide general insights into features that prevailed during the time in regard to conditions within the social structure and the changes that occurred in relation to the industrialization of the country. Consideration will also be given to an educational response of that time.

Sweden is a country in which accurate records have been kept since the early 18th century. There are slight discrepancies in various areas of statistics, but it is re-emphasised that the trends are the important aspect of any figures quoted.

Societal Conditions

At the end of the 18th century and into the early years of the 19th century the nobility was involved in serious financial problems and began to sell their land to the peasants.

In his book Peasant Life In Sweden, L. Lloyd distinguishes three groups or classes of people who might be thought of as being peasants in Sweden at that time:[1]

1. Peasants - they owned their own farm or alternatively worked crown land on easy terms.

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[1]L. Lloyd, Peasant Life In Sweden (London: Tinsley Brothers, 1870), pp. 360-1.

2. Cotters[1] - people who rented a small plot of land from someone else, had a few cows, some sheep and goats and perhaps a horse and a pig.

3. Day Laborers - these people were referred to as being in the least enviable position as they had nothing to fall back upon - no property and no real prospects of renting property. It was, most likely this group which provided the necessary labor surplus and also suffered the hardships associated with industrialization. As well, they probably benefited most by the increase in work and the improving conditions of society towards the latter stage of the 19th century.[2]

Montgomery estimated that at the end of the 18th century, eighty per cent or more of the population could be classed as agricultural and that the major proportion of this agricultural population belonged to a free peasant class.[3] Although not specifically stated it seems quite probable that this "free peasant class" consisted of all three categories outlined by Lloyd.

Sweden remained basically agricultural until relatively late in the 19th century. However, changes were noticeable in the industrial pattern from the middle of the century. Montgomery supports this position:

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[1]Lloyd indicates that these people had little to complain about in the social conditions existing at the time. (The interpretation of this statement is that these people were in a more comfortable position than the day laborers. It is not a comment on their particular quality of life as distinct from that of other peasants.)

[2]Lloyd, pp. 360-1.

[3]G. A. Montgomery, The Rise of Modern Industry in Sweden (London: P. S. King & Son Ltd., 1939), p. 1.

> . . . the urban population in Sweden - exclusive of Finland - at the beginning of the 19th century did not amount to more than about a tenth of the total population, and this proportion remained practically down to the middle of the century.[1]

Figures quoted in Colliers and Chambers Encyclopedias show the classification of Sweden's population as follows:

1866 - no more than 12% urban[2]
1880 - 15% urban
1890 - 19% urban[3]

The purchasing, by the peasants, of the nobles' land led to a system of enclosures, the day laborer being left in a position of having to find employment wherever he could. These people generally were able to find work on the "new" farms. Some of those who could not find employment made their way towards the city in the hope of finding work.

There was a continuing increase in population during the 19th century. This is illustrated in Figure 2. This increase was partly due to a rising birthrate but more strongly reflected a falling death rate - a similar trend to that shown at the comparable period of the industrialization of England. This continually increasing population trend placed a serious burden on the country and this is illustrated in the following quotation:

> From about the middle of the 18th century onwards, a mainly agrarian population "surplus" was created which

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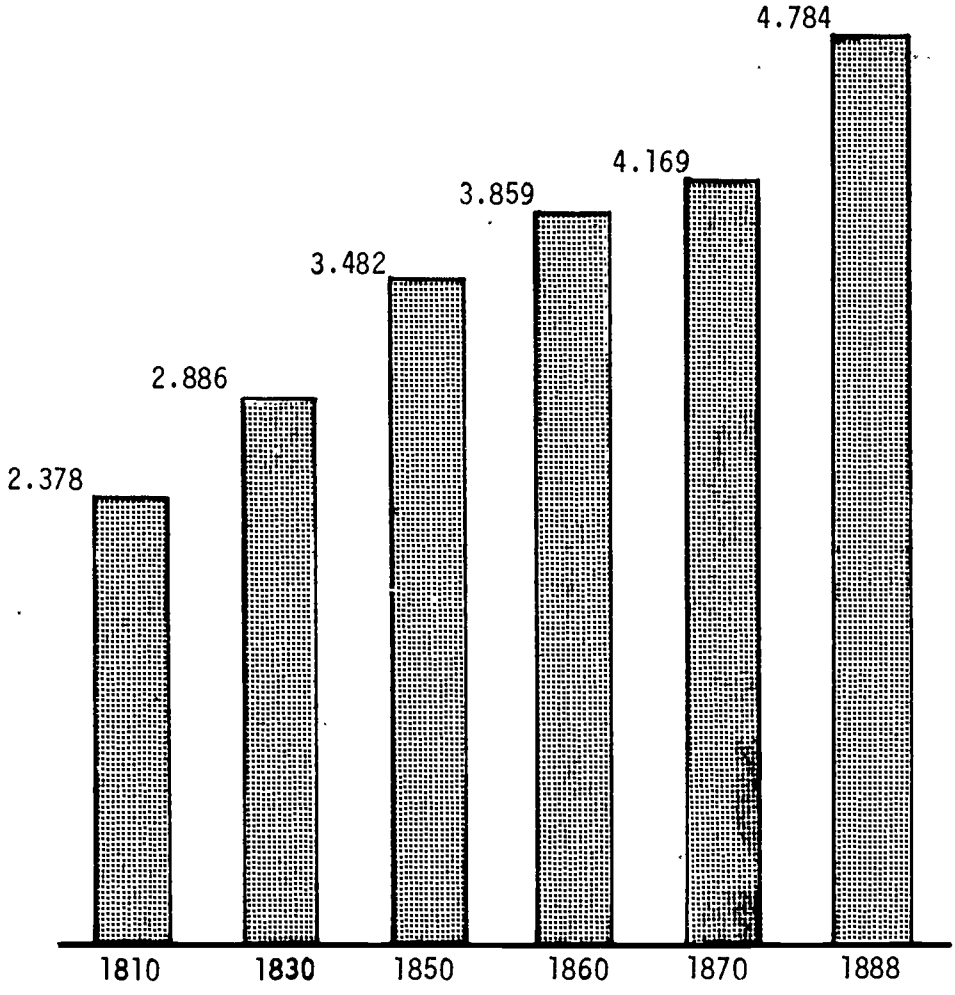
[1]Montgomery, p. 32.

[2]"Sweden," Chambers Encyclopedia, 1974, XIII, 347.

[3]"Sweden," Colliers Encyclopedia, 1974, XXI, 680.

Figure 2

Sweden - Population, 1810 to 1888
(expressed in millions)



Source

Dorothy Swain Thomas, Social and Economic Aspects of Swedish Population Movements 1750-1933 (New York: The Macmillan Company, 1941), p. 32.

> could not be fitted into the traditional social framework of the community. A re-adjustment of some kind or other seemed inevitable, and the problem of the landless agrarian population became gradually a main issue in political debate, especially in the 1830's and the 1840's.[1]

The agricultural industry became almost self-sufficient but made little technical progress mainly due to the abundant supply of cheap labor and possibly to a lack of funds. The open field system had disintegrated and was being replaced by a farm homestead.

The peasant was able to gain some additional money by carrying on weaving in the home. He grew his own flax and the women of the household would then weave the cloth, which would be made into clothes for members of the family. Any extra production was sold. Most of the peasants were also adept in some form or other of handcraft and were able to make articles for home use or for sale.

> To what extent the special sidelines of agriculture, in particular Sloyd or homecrafts managed to compensate for under-employment and improve the lot of those who were forced to buy the necessities, we do not know.[2]

A social problem which had developed in Sweden over a period of several hundred years was associated with the drinking of alcohol - distilled spirits in particular. Lloyd made mention of the problems of drinking among the Swedish adults and the effects this had on the people. Thompson outlines the magnitude and nature of the problem in the following quotations:

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[1]Montgomery, p. 39.

[2]Kurt Samuelsson, From Great Power to Welfare State (London: George Allen & Unwin Ltd., 1968), p. 150.

> The grape insists on sunnier climes, the grain is grown successfully and potatoes are produced in abundance. The result is that, from prehistoric times, the Swedes have consumed brewed beverages, and, for over three centuries, they have used distilled spirits.[1]

The spirit made from potato is called brannvin. It was used initially in the last part of the 16th century as a remedy for the plague. It is relatively certain that only the nobility and the wealthy were able to distill from grain, for the poor peasants had a greater need to use their grain for breadmaking and had insufficient for distilling purposes.

> The practice of unrestricted production and sale continued during the first half of the 19th century. It was not confined to the cities. The village taverns and country-side inns were places where thirsty peasants assembled for their serious drinking bouts, which frequently resulted in saloon quarrels and violence. Excessive indulgence was common. On festive occasions it was the rule rather than the exception. A host was mortified if the guests did not succeed in becoming intoxicated at his table.[2]

Thompson further points out that Einar Thulin who has a reputation for careful and painstaking research, has placed the per capita consumption of brannvin during the years 1820-30 as forty liters [approximately eleven U.S. gallons] per year. Working on a high birth rate as existed at that time this leaves less than half the population adults. On reducing this to males over the age of twenty one years, there should be approximately one quarter of the population in this group. On this basis Thompson estimates that every

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[1]Walter Thompson, The Control of Liquor in Sweden (New York: Columbia University Press, 1935), p. 4.

[2]Thompson, p. 9.

man could have half a gallon [five U.S. pints] per week and there would be a liberal supply for the women and children.[1] This seems to be a very conservative estimate by Thompson and calculations in a similar fashion suggest that the figure should be approximately forty four U.S. gallons per adult male per year [approximately 7.25 pints per week]. In 1850 reforms were undertaken and private distilling for home use was officially banned. Samuelsson illustrates the situation with the following quotation:

> A separate "artificial" market was created for aquavit with the disappearance of household distilling during the 1850's: from 1860 to 1865 the Swedish distilleries seemed to have produced at levels which exceed the value of timber exports.[2]

Writing in the Manual Training Magazine, Allison Farley discusses the relationship between the decline of the house industries and the tendency towards the use of intoxicating liquors.

> These evidences of growing weaknesses in national morals was [were] viewed with considerable concern by the intelligent people of Sweden who foresaw therein the decay of their national life. The contemporaneity existing between the decline of the house manufactures and the moral decline suggested the former as the possible cause of the latter.[3]

The liquor problem had been evident in Sweden over a prolonged period, and fluctuated mainly in accordance with Government restrictions on the brewing of alcohol. During this particular era there were no such restrictions, and while the decline of the home industries

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[1]Thompson, p. 9.

[2]Samuelsson, p. 152.

[3]Allison A. Farley, "Swedish Sloyd - I," Manual Training Magazine, 8:149, April, 1907.

would lead to more idle time, the lack of restrictions on alcohol brewing seems to be more connected to moral degeneracy than does the decline of the house manufactures.

Bennett takes a somewhat similar line to Allison Farley, indicating that increasing mechanization, due to industrialization, resulted in a plentiful supply of articles at a low cost.[1] These machine made items had popular appeal, possibly due to the novelty of such means of production. They created a situation which made it uneconomical to compete by hand methods. At the same time there was a propensity for the men to accept work in the expanding lumber industry. This required them to be away from their farms for prolonged periods and the women, left with the responsibility of running the farm, found little time to devote to homecrafts. The situation was further aggravated by the lifting of restrictions on the brewing and sale of liquor.

> A large part of the population became engaged during their leisure hours, in the production, sale, and use of brannvin.[2]

Bennett then goes on to suggest that instead of the young men spending their time at home in front of the fire they were more prone to go to the public houses where liquor was obtained.

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[1]It is not made clear whether this increasing mechanization was actually in Sweden, but from the time indicated it would be more likely that there was a flow of low priced items coming from the more highly industrialized England.

[2]Charles Alpheus Bennett, History of Manual and Industrial Education 1870-1917 (Peoria, Illinois: The Manual Arts Press, 1937), p. 102, citing A. Sluys, Manual Training in Elementary School for Boys, ed. Nicholas Murray Butler, Industrial Education Association Monograph, 1889.

It seems somewhat of a contradiction to say that the peasants were producing all the brannvin they wanted and then to say they were spending all their time "in public houses where liquor is obtained."[1] Probably there is some truth in each of these situations. The factor which is not made clear in any of the resource materials, is which group of peasants (according to Lloyd's classification) is involved in which activities. It seems that the peasants and the cotters could have been in a more favorable position to brew their own liquor, while the day laborers would be more likely to frequent the tavern - simply because of lack of facilities to grow their own ingredients to use in home brewing.

There arose from this social problem a temperance movement which managed, over a lengthy period and aided by Government restrictions, to successfully combat the problem.

> The temperance movement which emerged in the 1830's exhibited similar trends. It might be something of an exaggeration to say that the Swedes at that time were a besotted people. Nevertheless drunkenness was widespread; aquavit, the national alcoholic beverage, gave the poor man strength and solace to endure a wretched existence. To an extent that can scarcely be grasped today the consumption of spirits was then a formidable problem of public health.[2]

Urbanization

Because of the relatively small population and the growth of the timber industry, urbanization did not present problems of the same

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[1]Bennett, History of Manual and Industrial Education 1870-1917, p. 55.

[2]Samuelsson, p. 169.

magnitude that it had in England, but nonetheless, during the 1830's and 1840's conditions could be found which showed a strong resemblance to those that existed in towns throughout England during the industrializing period.

> Conditions in Gothenburg were no less revolting, and in several respects, they bore a likeness to the state of things in Manchester and other industrial centres of England during the opening decades of the industrial revolution.[1]

References can be found to similar type conditons that developed at the same time in Stockholm.

There existed up to the 1840's, a strict control over the utilization of the forest areas; with the result that the iron industry was virtually under a form of control, because it relied on the use of charcoal.

When England moved into iron production using coke this proved an enormous threat to the Swedish iron making industry because of the lack of natural resources of coal. The Swedes by concentrating on the improvement of the quality of their iron were able to remain competitive. Metallurgy developed sufficiently for them to be able to almost completely extract the iron from its ore, and to provide the better quality iron that was in demand. The English were producing high tonnages but of a somewhat lower quality, and while the percentage of high grade iron was only small, compared to the overall tonnage, it was sufficient for the Swedish iron industry to survive. This tradition has remained to the present time and Sweden is still recognized for the high quality steel it produces.

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[1]Montgomery, p. 49.

Some improvements that occurred in iron making are as follows:

1) the almost complete extraction of iron from the ore
2) the appreciable reduction in the quantity of fuel per unit of production.
3) an improvement in the uniformity of bar iron.

The blast furnace output was trebled between the 1830's and the end of the 1860's. The iron making industry altered very little from the 1750's to the 1830's and then showed signs of continuing development.

1820's production	80,000 tons	- same since 1750
1850's "	145,000 "	
1860's "	205,000 "	[1]

Transport has always been somewhat of a problem in Sweden. Winter was regarded as the busy season for it was at this time that ice and snow helped to overcome the problem of marshes and ponds and enabled the use of sleds.

Railways were first commenced in the 1850's but the principal development took place during the 1870's and for this reason did not play a major role in the development of industries in Northern Sweden for the period being considered.

An attempt to improve transport occurred early in the 19th century with the construction of the Gotha Canal. Mulhall indicates that this was finished in 1800,[2] while Samuelsson gives the finishing date as 1832.[3] Mulhall also gives figures which show that between

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[1]Ingvar Andersson, A History of Sweden, trans. by Carolyn Hannay and Alan Blair (2nd ed; London: Weidenfeld and Nicholson, 1970), p. 353.

[2]Mulhall, p. 105. [3]Samuelsson, p. 160.

1840 and 1860 - the starting time of industrialization - some £200,000 [$400,000] were spent in canal construction.[1] This in itself was indicative that there was an increasing importance being placed on transportation. Andersson indicates that the only expense in improving the transportation was the clearing and straightening of water-ways.[2]

> In the South and the Midland of Sweden the commercialization of the inland districts had largely been bound up with the progress of railway building. But the rise of the timber trade of Northern Sweden in the 19th century owed comparatively little to the railways. From the point of view of transport it was mainly connected with the development of the network of floating waves.[3]

The development of the iron industry and the use of steam power led to the growth of an engineering industry and Samuelsson maintains that by the mid 19th century there were at least twenty engineering works engaged in the manufacture of steam engines, turbines, rolling mills, threshers, bridges and machine tools.[4] This indicates the range of products that this engineering industry was producing.

It was industrial developments such as this which helped to alleviate the population expansion problem. This was constantly present when between 1867-86 some 340,000 Swedes emigrated.

An Educational Response - Educational Sloyd

Sloyd is a system of handwork or manual training that was developed in the Scandanavian countries. There was a number of variations to be found in the Northern European countries. The

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[1]Mulhall, p. 105. [2]Andersson, p. 353. [3]Montgomery, p. 19

[4]Samuelsson, p. 159.

particular interest of this study is that branch known as Educational Sloyd. The historian, Cromholm, has recorded that Sloyd Schools were in existence in Sweden and Norway prior to 1844, and in fact, a Swedish association was formed in 1846 for the purpose of promoting the instruction of Sloyd within the schools.[1] The Sloyd being referred to here is not the Educational Sloyd which developed later in the century. This early Sloyd was mostly utilitarian in purpose. The models were sold if possible and the pupil was paid for any sales. This unfortunately led to the situation where articles were made because there was a ready demand and a likely sale. There was little or no consideration given to the educational benefits for, or requirements of, the pupil. The teacher, who was an artisan, was expected to assist the child wherever possible even to the extent of helping in the finishing of the article to make it more readily saleable. The type of work undertaken closely resembled the Home-craft Sloyd.

In 1872 two important events occurred in relation to the development of Sloyd in Sweden. The first was that the National Chamber of Deputies granted an annual subsidy to stimulate instruction in Sloyd, and there were subsequent increases in this amount. The second event of importance was the establishment by August Abrahamson,[2] of a School of Sloyd on his property at Naas. It seems

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[1]Bennett, History of Manual and Industrial Education 1870-1917, p. 55.

[2]A lengthy quotation has been appended. (See Appendix A). This extract from an article by Gustaf Larsson, written as a tribute to Otto Salomon after his death, deals with Augustus Abrahamson and

a happy coincidence that at this time the Chamber of Deputies had decided to subsidize the instruction of Sloyd. It has been suggested that this school was established because of Abrahamson's concern for the welfare of the people on his property, and it could be pointed out that he had previously re-built some, if not all the workers' houses on his estate. Gustaf Larsson[1] reported:

> His [Salomon's] uncle, the large-hearted, and public-spirited philanthropist, August Abrahamson, entered warmly into the scheme of his nephew, and his fortune was devoted to the establishment and maintainance [maintenance] of a school on his own estate at Naas . . . .[2]

The school was opened for boys in 1872 and was followed in 1874 by a school for girls. The shortage of teachers of Sloyd proved to be a problem, and in an endeavor to correct this situation, there was opened in 1874 a teacher training department.

The educationalists of the time were insistent that the subject should play a role in general education and not be a purely economical movement. It was at this stage, in 1877, that Salomon journeyed to Finland where he met Uno Cygnaeus who had been given the task by the Czar of Russia of building an educational system for

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his contribution to the establishment of the school at Naas. The main inference of this quotation is that Abrahamson and Salomon were progressively minded people who saw in Sloyd, not a static system, but one which would be capable of adjustment to meet the needs of the time.

[1]Larsson was a Swede who set up a school of Sloyd in Boston, Massachusetts. He was an outspoken proponent of Educational Sloyd and his work provides an interesting study on its own.

[2]Gustaf Larsson, "Otto Salomon - 1849-1907," Manual Training Magazine, 10:105, December, 1908.

Finland. Salomon later said of Cygnaeus:

> He was the first to draw a sharp distinction between the Sloyd school and the Sloyd instruction for elementary schools. The Sloyd school he [Cygnaeus] regarded as a kind of trade school and the primary he thought of as an instruction having a general educational aim, it being the only real elementary school for all. He was of the opinion that the Sloyd instruction, which was to be given in the elementary school was not to be a special technical training, but rather a general useful foundation. "The Sloyd in the primary school must be a means of formal education" was one of the chief maxims of Cygnaeus . . . .[1]

Salomon became renowned throughout many areas of the world for his pedagogic development of this educational system; his constant attempts to improve it, and for the principles he laid down for its implementation. He was not the originator of Sloyd, nor of the movement to introduce Sloyd into the schools. He had what must be regarded as a moderate education.

> Salomon had no preconceived philosophy of a profound or thoroughgoing thought; no knowledge of modern psychology by which to test the validity and correctness of the results of his experiments. He built up his theory along with his practice, a factor of great significance in the evolution of the system. He supplemented his personal investigations by extensive reading of the history of education and by travel and observation of the contemporary education in the various countries of Europe.[2]

His abilities are surprising, and are revealed to some extent in the following quotation:

> He had travelled extensively, and had a wide correspondence with some of the most thoughtful and distinguished scholars of the time in many parts of the world. He was

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[1]Bennett, History of Manual and Industrial Education 1870-1917, p. 60.

[2]Allison A. Farley, "Swedish Sloyd - I," p. 151.

> also an indefatiable worker. Besides his lectures at Naas on various educational topics, sometimes three or four times a day, in different languages, Herr Salomon is the author of several books, monographs and articles for magazines upon educational handwork. He was the editor of a series of educational classics, and has translated for his countrymen the works of Comenius, Locke, Rousseau, Saltzmann, Pestalozzi, and later James Freeman Clark's "Self Culture".[1]

That Salomon had given much thought to the structure of Educational Sloyd is evident in the way he has related it to the individual. He believed it should be individually taught. He also believed that individual instruction can be applied to a group[2] when all members of that group are at the one stage of preparedness, e.g. at the commencement of some new task that none of the group members has attempted previously.

Artisans were initially employed to teach Educational Sloyd. It was found by experience that the ordinary workman was not as suited to this task as had initially been believed. The reason for this is interesting and is associated with the aims of Educational Sloyd. It was argued that if Educational Sloyd were to be a means of education then the teacher should be an educator; and as Sloyd does not have dexterity of hand, use of tools, or making of models as principal aims, then the use of an artisan as a teacher is unwarranted.[3]

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[1]Larsson, p. 104.

[2]An interesting graph depicting Salomon's ideas of individualizing instruction, commencing with a group where all members are at the one level is to be found in:
Otto Salomon, The Theory of Educational Sloyd, rev. and ed. by An Inspector of Schools (Boston: Silver, Burdett & Co., 1896), p. 62.

[3]Salomon, p. 69.

With this movement away from the artisan as a teacher, the training of teachers took on a new prominence and initially one year courses were offered. Later these were broken to five-week courses and still later they became six-week courses.[1] The interesting feature of all these courses is that many teachers from various parts of the world travelled to Sweden to participate in them. The Swedish teacher was able, because of an eight month teaching rule, to take the course at a time convenient to himself. The popularity of these courses can be gauged by the fact that between the years 1875 and 1893 - listing only first year students - 1,985 students from twenty seven countries attended the courses. There can be no doubt that this system of Educational Sloyd made an impact in many countries at that time. The degree of impact this system made in various countries could be a study in itself.

Of those who journeyed to Naas, some understood the principles and were able to effectively apply them on their return to their own country. Unfortunately, this was not always the case; others simply collected the models and their order of presentation and on their return tried to make those same models in the same sequence. This latter technique rarely proves successful and was responsible for a reaction against the Sloyd system in some cases. Gustaf Larsson was

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[1]The discrepancy in time between the one year and five week courses in teacher training appears to be due to the fact that there was a shift in educational thought regarding the use of specialist teachers for teaching Educational Sloyd. The later development was that the general teacher, selected on a volunteer basis, would teach the subject as well as teaching in other fields. The need for the prolonged training was therefore obviated.

one person who was able to adapt Sloyd to the new situation and his school in Boston flourished for many years.

The fact that there was an awareness of the need for Sloyd in Sweden at that time, can be seen in the actions of a contemporary sculptor, Charles Ashborn, who between the years 1870 and 1875 gave somewhere in the vicinity of two hundred lectures to some 60,000 people supporting the cause. In 1874 in response to a Government enquiry of local authorities regarding the state of Home Sloyd, the reply was given that in all parts it was regressing. The following three reasons were advanced as possibilities for this retrograde movement:

1. the means of internal communication had improved, and such articles that were previously made at home were more easily purchased, and hence the home industry fell off.

2. factories had considerably increased, and keener competition reduced the prices of the articles.

3. the elementary schools, which had not been long in vogue, had taught the people to read and write, and, consequently less time was given to what may be termed "Home Sloyd".[1]

In developing Educational Sloyd, Salomon maintained:

> Its purpose is not to turn out carpenters, but to develop the mental, moral, and physical powers of children; and it is the most effective instrument yet devised for securing this development.[2]

as well, it was a means of "formative" education.[3] He did, however,

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[1]Salomon, p. 144. [2]Salomon, p. 1.

[3]Salomon explained formative education as that in which "stress should be laid upon the proper development of the powers and faculties of the child." See Salomon, p. 3.

indicate that there were certain "utilitarian"[1] aims associated with it. He outlined the aims as follows:

Formative aims:

1. To instill a taste for, and a love of, labour in general.
2. To inspire respect for, rough, honest, bodily labour.
3. To develop independence and self-reliance.
4. To train in habits of order, exactness, cleanliness, and neatness.
5. To train the eye and sense of form. To give a general dexterity of hand, and to develop touch.
6. To accustom to attention, industry, perseverance, and patience.
7. To promote the development of the physical powers.

Utilitarian aims:

1. To directly give dexterity in the use of tools.
2. To execute exact work.[2]

Salomon set out specific ideas relating to the types of models and the principles involved in the arrangement of the series of models. His general principles relating to the series of models are as follows:

1. All objects of luxury - knick-knacks - should be excluded.
2. All models should be serviceable in the house.
3. They should be capable of being finished by the children without help.
4. The models should be of wood, and only wood should be worked in, as a rule.
5. The objects should not be polished or stained.
6. The objects should be such as to require as little wood as possible.
7. The children should be taught to work in harder and softer kinds of wood - but not in the hardest or the softest.
8. Turnery and carving should be used very little.

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[1]Utilitarian education is when "most stress must be laid upon giving the child that knowledge and dexterity which is useful in life." See Salomon, p. 2.

[2]Salomon, p. 7.

9. Objects chosen should be such as will develop the sense of form.
10. All the exercises which the child is capable of making should be properly graduated and included in the series in due proportion.[1]

The following eight points cover the principles on the arrangement of a series of models.

1. The series should proceed from the easier to the more difficult, and from the simpler to the more complex.
2. A refreshing variety must be afforded.
3. In the early part of the series, the models should be capable of being quickly and easily made, and should be so progressively arranged that, later on, the objects arrived at should require more time and skill, and yet be capable of being done without help.
4. In the production of the early models, few tools should be required.
5. That every model should be so placed in the series, that the necessary qualifications for doing it exactly are found in the child.
6. The models must be so arranged that the pupils can always make not only a serviceable, but an exact copy.
7. That the knife - as the fundamental tool - be used frequently, especially at the beginning.
8. That generally in the early models the softest wood should not be used.[2]

It is interesting to note in point 4, under "general principles relating to a series of models", the insistence on the use of wood. It has been suggested that Salomon's insistence on wood was perhaps due to economy, Sweden being richly endowed with timber. However, not all of Sweden had a plentiful supply of wood, some areas having insufficient for home fires. As Salomon believed that there should not be too much diversification in the type of activities offered to pupils, it is more likely that he chose wood Sloyd because it offered a more complete educational, instructional medium.

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[1]Salomon, pp. 72-4. [2]Salomon, pp. 75-6.

To illustrate his preference for Sloyd carpentry, Salomon applied ten criteria to each of twelve Sloyd activities. The only Sloyd which positively met all twelve factors was Sloyd carpentry. Appended is a table reproduced from Theory of Educational Sloyd which sets out the criteria and comparative answers.[1]

The growth of Educational Sloyd between 1876 and 1884 is illustrated in the graph, Figure 3.

Summary

Conditions in Sweden during the 19th century were basically agricultural. There were definite signs of developing industrialization, and the social conditions that plagued England during the industrialization period could also be found in city areas. Some factors common to both countries were the enclosures, the creation of a landless peasantry (the day laborer) and the increasing population. These were both advantageous and destructive. It was through them that the work force to allow for expansion became available, but they also created the dehumanizing urban conditions under which people were forced to live.

The development of Sloyd has been attributed to the concern of interested people and the Government for the social well-being of the population following the decline in home industries because of industrialization and the liquor problem.

Educational Sloyd, however, developed because of the interest and concern of Otto Salomon. It was he who provided the pedagogic

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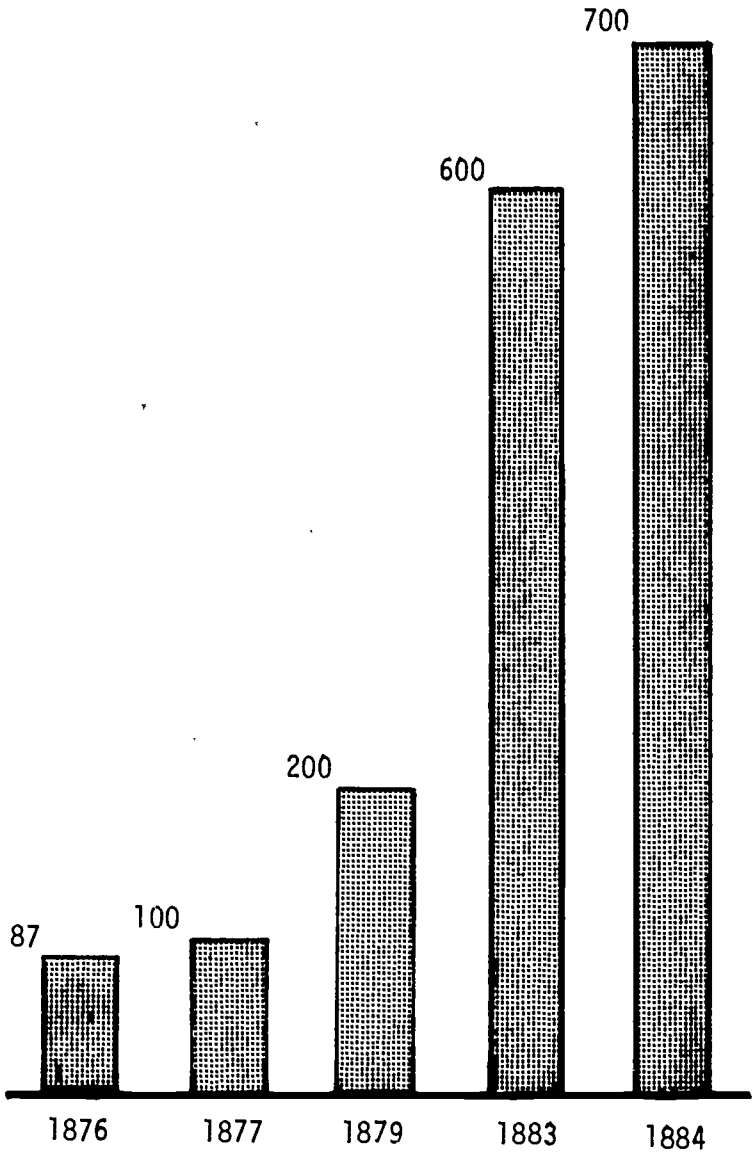
[1]See Appendix B.

Figure 3

Nos. of Schools Teaching Educational Sloyd



Source

Charles Alpheus Bennett, History of Manual & Industrial Education 1870-1917, citing A. Sluys, p. 103.

foundation based on the philosophic beliefs of earlier educators. It was he who provided the systematic and logical approach to the subject.

Educational Sloyd had an influence on the development of manual type subjects in many countries throughout the world. Teachers came from many areas to learn about this system. This in turn, proved to be one of the greatest weaknesses in its development in other countries, because the teacher having attended a course was inclined to believe that the models and order of presentation should not be changed and because of this there was often little relevance to the life of the community where it was introduced.

ENGLAND - 19TH CENTURY

Introduction

The study of societal and industrial conditions in England is complicated by the intricacies of inter-related factors during what might be termed the latter stages of the industrial revolution. In this section there will be presented an overview of conditions pertaining to society and industrial development during the 19th century. This will be followed by a consideration of the Arts and Crafts Movement which developed in the second half of the century.

It is emphasised that wherever statistics are used the trend indicated is to be considered of greater significance than any absolute values quoted as there was little consistency in terms of actual values between one source of information and another. However, in all cases examined the trend was similar.

The 19th century could be considered the starting point for changes which have continued at an ever-increasing rate. Some conception of these changes is illustrated by the following facts. At the beginning of the century gas was used for illumination and at the end of the same century there were approximately seventy miles of electric traction tramway. Also, there was a marked change in water transport from the wooden hulled sailing vessel of the earlier years to the iron clad steam powered vessel of the later period.

Societal Conditions

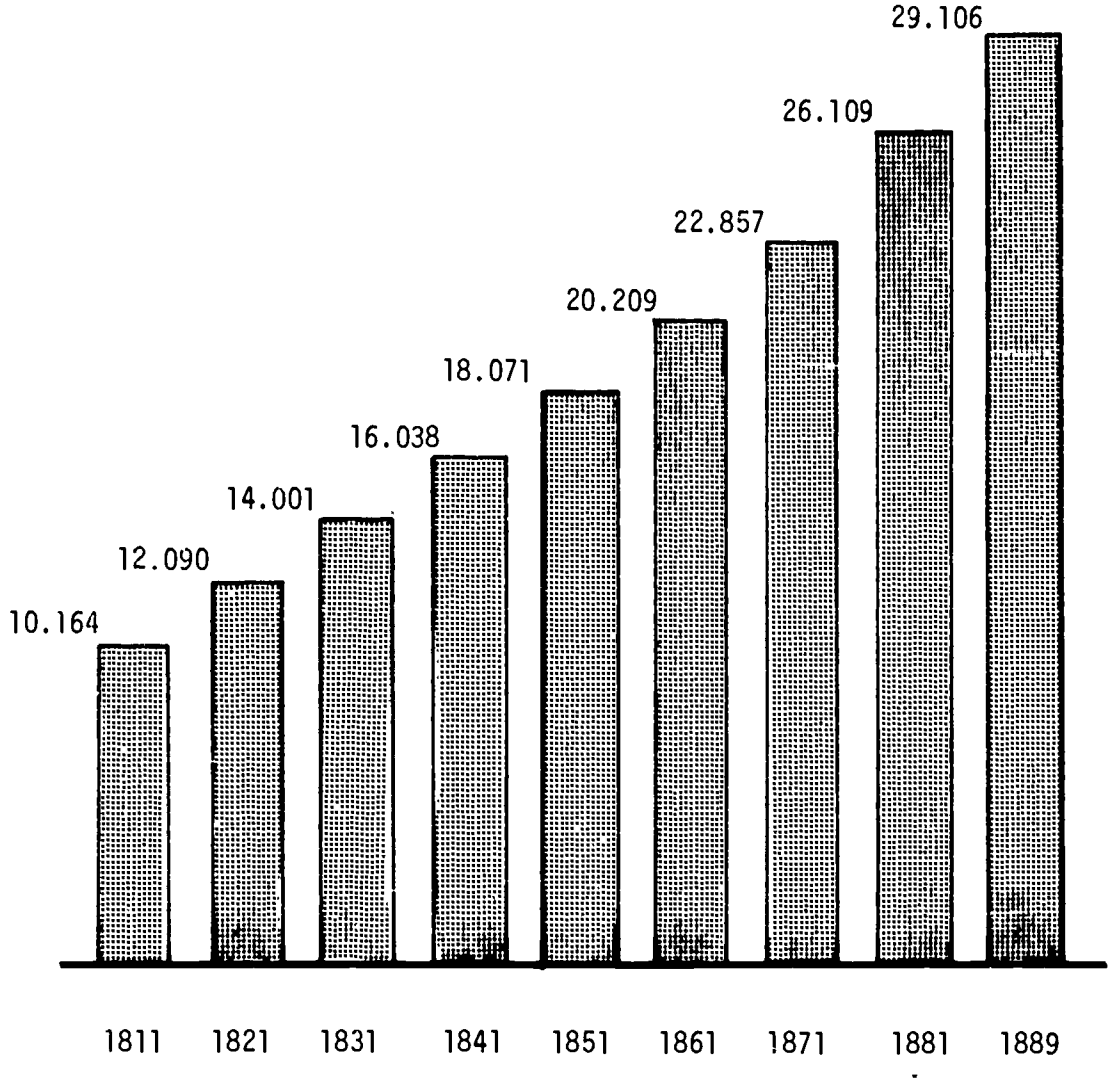
England emerged triumphant in 1815 from the Napoleonic wars. However, all was not tranquil at home. With large numbers of soldiers returning to ordinary life, England was faced with a huge employment and social problem. The price of grain was very high and supported by the Corn Laws. The original intent of the Corn Laws was to maintain the high prices of grain so that farmers would receive a good return and subsequently could pay better wages to the agricultural laborers, but what actually happened was the reverse. The price was too high for the farmers to sell the grain, the returns were not satisfactory, wages fell and people could not afford to buy food because of the high rising prices.

In the mid 1830's, conditions improved somewhat for the working people, but another severe recession occurred about 1840. Things improved a little from the mid 1840's onward till the latter part of the 19th century when wages began to fall, but this time prices also fell, and at a faster rate than wages, with the result that people were able to maintain a relatively good standard of living.

There was during the period an increase in the population of England as illustrated in Figure 4. This gain was not entirely due to a higher birth rate, but rather to increased life expectancy combined with a lower infant mortality figure. Added to this was the impact of Irish immigration. These three factors were operable throughout the 19th century, and between 1851-71 helped maintain population increases despite considerable emigration.

Figure 4

England - Population, 1811 to 1889



Source

Mulhall, p. 441.

A rather significant fact that is not evident in the figures themselves was pointed out by Thomson in his book England in the Nineteenth Century. In 1815 most Englishmen lived on the land or were closely connected to it, but by 1831 Thomson estimated that half the population was living under urban conditions.[1] This in itself indicates the social pressures that must have grown. These people would need housing, food and employment. It is easy to visualize the type of overcrowding that must have occurred.

The number of people employed in agriculture is indicated in Figure 5. It is interesting to note that while the numbers of persons directly engaged in agriculture rose till 1851, there was a decline thereafter, but the production per person rose throughout the whole of the century. While there is no simple explanation of all the related facts leading to this situation, it is significant that after the repeal of the Corn Laws (1846) the farmers set about improving the efficiency of their farms and introduced machinery such as the steam plough.

The Corn Laws had reduced a great number of the population to paupers. One attempt to overcome the effects of the consequent reduction in wages and lowered standards of living was the payment, commonly referred to as Speenhamland. Under this scheme persons were paid a certain amount depending upon the size of their family. The intention here had been to see that the laborers received sufficient to live on, but again it did not work this way in practice, for when

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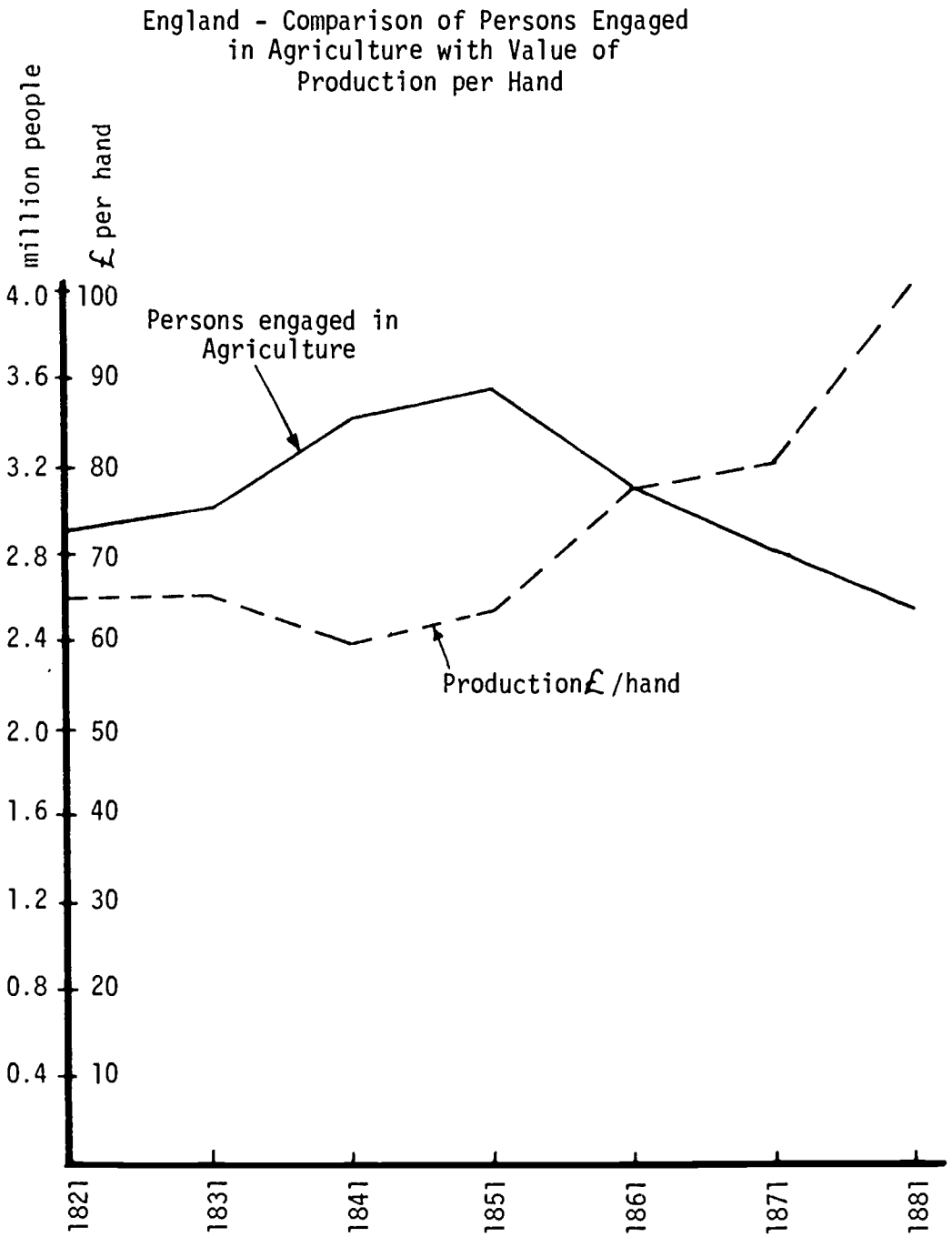
[1]David Thomson, England in the Nineteenth Century 1815-1914 (Baltimore II, Md.: Penguin Books Inc., 1963), p. 11.

Figure 5



Source

Mulhall, p. 15.

these people received the payments their employers reduced salaries so that instead of improving the situation of these people, it actually deepened their plight.

Urbanization

The drift of population to the cities caused partly by the enclosures[1] and partly by the thought that work would be available in the factories brought with it a great many undesirable features, one of which was the necessity of women and children to go to work to earn sufficient money to provide family maintenance. People were forced to live in inadequate situations, many reports indicating that whole families shared one room with no sleeping facilities. Landlords were most reluctant to do anything by way of repair to the houses, for repairs were usually shodily done and the tennants quite often removed fittings and sold them.

No sanitation was provided in the early part of the 19th century, due mainly to the rapid urbanization and the inability and reluctance of authorities to provide the necessary finance. It was a common practice for sewerage to pass in open drains or collect in courtyards from where it would be removed to be dumped into the river. It is little wonder that under these unsanitary conditions there were frequent outbreaks of cholera and typhus. It is a wonder that people survived at all! In London there was no attempt to rectify the situation until the River Thames became so polluted that the stench was offensive to

[1]The enclosures refer to the division of what was formerly common ground. This land came into the possession of individuals rather than the collective community and deprived many common people of the right to farm or graze animals.

the members sitting in the Houses of Parliament. It was at this time that approval was given for the construction of a sewerage system.

Table 1

England - Growth of Towns, 1801 to 1887

	1801	1821	1841	1861	1887
London	959,000	1,379,000	1,948,000	2,804,000	4,215,000
Liverpool	82,000	138,000	286,000	444,000	503,000
Manchester	77,000	129,000	243,000	358,000	378,000
Birmingham	7.,000	102,000	138,000	296,000	441,000
Leeds	53,000	84,000	152,000	207,000	345,000
Sheffield	46,000	65,000	111,000	185,000	316,000
Bristol	61,000	85,000	125,000	154,000	224,000
Nottingham	29,000	40,000	52,000	75,000	224,000
Bradford	13,000	26,000	67,000	106,000	224,000
Hull	30,000	45,000	67,000	97,000	109,000
Newcastle	33,000	42,000	70,000	109,000	157,000
Brighton	7,000	25,000	49,000	87,000	118,000
Total	1,461,000	2.168,000	3,353,000	4,922,000	7,434,000

Source

Mulhall, p. 445.

From the enactment of the Corn Laws, civil disturbances by small groups were certainly not uncommon and many of the wealthier people had their houses burned. With the continuing growth of urbanization and the recurrent periods of depression, crime was found to be increasing at what was regarded as an alarming rate. At this time there was no police force, but rather the authority was invested in the Justices of the Peace who in turn could call in military personnel. In 1829 after a number of years of political campaigning, Robert Peel was successful in having a constabulary established in London. While this

was not popular initially, it did help in arresting the rising crime rate and gave people a greater sense of security. It proved so successful that within thirty years most counties had followed the example of the metropolis.

A further illustration of the movement from rural to urban living may be seen in Table 1 which shows the increase in numbers of people in the city areas during the times indicated.

Industrialization

The coal mining industry provides us with an interesting aspect from which to consider a number of features of industrialization and the subsequent effects on the people.

People worked in the mines under deplorable conditions. This applied equally to women and children. Children as young as five years of age were employed. The following passage is a footnote by Trevelyan and gives a rather poignant description of the conditions under which people were forced to labor.

> As late as 1842 the Royal Commission on Mines, that first threw light on the life of underground England, brought out such facts as these from a Lancashire woman: "I have a belt round my waist and a chain passing between my legs, and I go on my hands and feet. The water comes up to my clog tops, and I have seen it over my thighs. I have drawn till I have the skin off me. The belt and chain is worse when we are in the family way." It was also shown that children under five worked alone in the darkness.[1]

It was from an enquiry such as this that limitations were placed on the hours of work of women and children in the mines.

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[1]George Macaulay Trevelyan, British History in the Nineteenth Century (1872-1901) (London: Longmans, Green and Co., 1931), p. 157.

Children between 8-13 were permitted legally to work 6-1/2 hours per day, while women above 13 years of age were restricted to 12-1/2 hours of work per day.[1] It was in the 1840's that the appointment and training of inspectors to enforce conditions were undertaken.

Coal production increased rapidly during the 19th century. In the years 1820-30 it went from 15 to 30 million tons.[2] These figures indicate that there must have been tremendous changes in demand occurring. It would be erroneous to claim that this change in demand was due to any one source. The increase in iron production concomitant with the increase in railroads and the adaption of steam to power production and shipping all played a part in the demand for coal. This is all the more impressive when it is realized that in 1829 Neilson developed the hot blast for smelting and effected a 33% saving in the coal required per ton of iron produced. Another reduction in per ton consur ion of coal for iron making was achieved in 1847 with Cowper's regenerator, which preheated air to approximately 1500°F. These and other technological developments between about 1820 and 1890 reduced the amount of coal per ton of iron from 5 tons to 2.1 tons, but during the same period the production of coal itself increased from 12-1/2 million to 177 million tons.[3] While the amount of coal per ton of iron produced fell, the number of

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[1]Anthony Wood, Nineteenth Century Britain 1815-1914 (New York: David McKay Company, Inc., 1966), p. 118.

[2]Mulhall, p. 121. [3]Mulhall, p. 121.

tons of iron produced rose from approximately 400,000 to approximately 8-1/4 million during the same period.[1]

The development of railways played a large part in the handling and use of raw materials. There had been improvements made to the canal system in the early part of the 19th century, but these were unable to cope with the demands being made upon them and were forcing up the costs of goods transported and causing delays. The 1830's to the 1850's became almost an era of railways and steamships. There was of course a great deal of iron required and later steel for the making of the products which had in previous years been of wood. Bridges and railway lines were now being constructed of iron and steel. The locomotives themselves required iron for their construction.

The building of the railway system provided a great deal of work for the laboring class. In addition goods were transported much more quickly and at a lower cost. W. Cunningham quoted Professor Levi in 1871 as stating that the railways from Liverpool to Manchester carried on an average, 1070 passengers per day at a cost of 5/-d. [50 cents] inside and 3/6d. [35 cents] outside as compared to a coach fare of 10/-d. [$1.00] inside and 5/-d. [50 cents] outside. This difference becomes even more significant when it is realized that the time of travel by rail was 1-3/4 hours, whereas the coach took 4 hours. The goods rate by rail was 10/8d. [$1.08] per ton and by barge 15/-d.

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[1]Mulhall, p. 332.

[$1.50] per ton.[1] Here again the time factor becomes significant - approximately two hours by rail and twenty hours by canal. A further benefit which is not at first apparent is that with the reduction in time of travel it meant that fresh fruits and perishable goods were able to be taken much greater distances to markets, so that people were able to improve their diet without having to bear large increases in costs.

An unknown Manchester man of the time made the following observation in relation to the newly opened Liverpool and Manchester railway:

> A million of persons will pass over it in the course of this year and see that hitherto unseen village of Newton; and they must be convinced of the absurdity of its sending two members to Parliament whilst Manchester sends none.[2]

This person obviously saw that the parliamentary system of landed gentry could not be maintained when such developments were taking place.

Figures taken from Mulhall indicate that in 1850 there were 6,620 miles of track laid in Great Britain and the cost was quoted at £ 240.3 million[3] [$US. 480.6 million]. Mulhall also gives figures for a later period specifically related to England as distinct from Scotland and Ireland and these are:

1860	7,580 miles of track[4]
1888	13,980 " " "

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[1]W. Cunningham, The Growth of English Industry and Commerce in Modern Times (New York: Augustus M. Kelley, 1968), p. 812.

[2]Thomson, p. 42. [3]Mulhall, p. 500. [4]Mulhall, p. 500.

Despite the high cost, the construction of the railway proceeded and became an integral part of the industrial development of the time.[1]

Two other related factors in the development of iron and steel and the railways were the growth of engineering, and metallurgy. From the time that Watt developed his steam engine there had been problems in construction because the machine tools available were very rudimentary and there was also a lack of skilled men to work the new contrivances. The development of the specialized engineering industry was of crucial importance to the machine development side of the industrial revolution. Metallurgy was also necessary in the development of better qualities of iron and steel, better techniques and greater understanding of the processes involved.

While there was a continuing and, at times, rapid development in the cotton industry, not all of this took place within a factory as we would understand it. In 1835 it was estimated that half the workers in the cotton industry worked "outside" the factory, and even as late as the middle of the 19th century one-third of the workers were still outside the factory system. This tendency had not completely disappeared by the turn of the 20th century.

As mechanization of the cotton industry proceeded, the number of persons employed remained about the same. However, the machine had

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[1]Wood indicates to us that part of the high cost of developing the railway system was involved in overcoming social prejudices. Many of the property owners adjacent to the places where the rails were to be laid believed their properties would be ruined and sought extremely high prices. In one or two instances money was actually returned to the Government when the owners came to realize that the railway was not ruining their land. (See Wood, p. 101).

a much higher rate of production than was achieved by hand with the consequent result that the increase in production was not reflected in the number of operatives employed. Eli Whitney's cotton gin (1793) was a necessary pre-requisite to the development of this facet of the economy.

This expansion carried through into many aspects of English manufacture and contributed greatly to the upsurge in living conditions between 1850-70. In most of the textile industries workers had a 10-1/2 hour day, a 60 hour week and a holiday on Saturday. Wages rose steadily between 1850-74 and prices also rose during this period. After 1874 wages fell, but because prices fell much faster, a big majority of the workers enjoyed a better standard of living and prosperity.

An Educational Response - The Arts and Crafts Movement

The Arts and Crafts Movement developed as a reaction to the method of industrialization in England during the 19th century. It was really a protest against the manner in which humans and their skills were being subordinated to the demands of the machine.

Machine production and speed of manufacture had become the thought uppermost in the minds of the manufacturers - the efficiency of the worker was associated with long hours; the conditions of the employees were considered to be of minor importance; beauty and art were neglected in the design of articles.

It was against a background such as this that the movement for personal involvement in production and design gained importance and strength. As in all such movements some names gained more prominence than others and the names of Thomas Carlyle, John Ruskin and William

Morris are the ones which are most notable in this period. It is stressed that these three people evolved the ideas that led to the Arts and Crafts Movement over a period of time. This idea of Arts and Crafts being a development of thought over a period of time is supported by Triggs who indicates, "its development as an idea being measured by the lives of Carlyle, Ruskin and Morris."[1] Triggs' statement implies that the lives and thoughts of these three men became interwoven in the Arts and Crafts Movement.

William Noyes when talking about the Arts and Crafts Movement is reported in the Manual Training Magazine as stating:

> Ruskin and Morris were primarily artists, but it was because of their deep moral sense of injustice and wrong of the present industrial system that they devoted their lives to making art a common possession.[2]

The word "common" in this context implies, "belonging to all" and their endeavour was to bring art aesthetics into the lives of all people.

Not all writers make mention of Carlyle, but it would seem an error to dismiss him as being unimportant, for while he may not have made an actual practical contribution, he was certainly the first to point to the wrongs of the industrial situation. He criticised the lack of involvement of the worker in the finished product and the conditions under which these people were forced to work.

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[1]Oscar Lovell Triggs, Chapters in the History of the Arts and Crafts Movement (Chicago: The Bohemia Guild of the Industrial Art League, 1902), p. 1.

[2]William Noyes, "Ethical Values," Manual Training Magazine 1:203, February, 1910.

Noyes suggests that the Arts and Crafts was an "ethical movement"[1] and it was not until late in the 19th century and early in the 20th century that steps were taken to place this movement on a practical educational type basis.

To aid understanding, a brief review of the roles of Carlyle, Ruskin and Morris will follow.

Triggs refers to Carlyle as "never anything more than a voice crying out in an age of transition." He quotes Carlyle as having written as early as 1831: "The doom of the Old has been pronounced and irrevocable; the Old has passed away; but alas, the New appears not in its stead; the Time is still in pangs of travail with the New." and later: "You perceive, my friends, we have actually got into the 'New Era' there has been such prophesyings of; here we are, arrived at last; and it is by no means the land flowing with milk and honey we were led to expect."[2]

Carlyle saw in the industrialized cities and towns a form of beauty; the movement of the workers to and from the factory; the hum of activity after the factory whistle blew in the morning; the feeling of life and movement. He believed in the value of work, its beneficial qualities; the joy and pleasure to be derived from being personally involved. He saw also the squalid conditions under which people were forced to live and work; the tyranny of the factory owner; the oppressive burden of the machine, constantly demanding the attention of the operator. This was not what he philosophically

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[1]Noyes, p. 205. [2]Triggs, p. 2.

referred to as work. It was against these dehumanizing conditions that he wrote and spoke.

Thomas Carlyle as an historian was well aware of the manner of teaching in the schools and it is interesting to see the learning by doing idea appearing in the notion of "'mute education' - an education, that is, of the deed, and not of the word; or, as he [Carlyle] describes it, 'a training in practicality at every turn'."[1]

"Cheap and nasty"[2] was the manner in which Carlyle referred to most manufactured goods of the time. He was here also alluding to the way in which the worker had no real influence on the final product in terms of its design - the only influence the worker could exert was in terms of speed of production.

Carlyle saw the faults in the industrialization of the nation, but he did not himself become involved in the practical side of showing how things could be improved. He looked for a political-type leader who would take control of the chaos he saw about him, and create order for the developing, industrializing nation.

Carlyle was a friend of Ruskin and his words had a direct effect on Ruskin's thoughts. Ruskin rose to greater heights than Carlyle, for while Carlyle pointed the way, Ruskin trod the path. Morris in turn, with his artistic skills was able, in a very practical sense, to lead the return to the involvement of the worker in the design and making of articles.

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[1]Triggs, p. 7. [2]Triggs, p. 9.

John Ruskin was a sociologist who studied art to gain a better understanding of life. He was also a prolific writer. "There is practically no subject of human interest he did not discuss and there is no discussion that is not in some degree illuminating."[1] Triggs uses quotations from Ruskin's works which serve to illustrate the ideas he held regarding work and life.

> There is no wealth but life, including all its powers of love, of joy, and of admiration.
>
> The wealth of nations as of men, consists in substance not in ciphers; and the good of all work and of all commerce, depends on the final intrinsic worth of the things you make, or get by it.[2]

Ruskin believed that work should be honest, useful and cheerful, and that people should see in their work a duty which in turn should provide them with pleasure and joy. Work should impart a quality to life which should lead to improvement as opposed to degradation.

"Life without industry is guilt, industry without art is brutality."[3] This quotation expressing Ruskin's thoughts, provides a relationship between the philosophical thoughts of both men.

Ruskin indicated that articles made without due consideration for their aesthetics were useful but uninspiring objects, giving no value to the maker or to the user.

Ruskin, like Carlyle, was obviously concerned with the conditions under which people were producing goods, or in other words, the dehumanizing of the workers by machines. Both men saw

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[1]Triggs, p. 12. [2]Triggs, p. 31. [3]Triggs, p. 53.

people becoming slaves to the machines rather than, as it should be, the machine contributing to the good of man.

During the 19th century there was a tendency to restore old buildings, but often little attention was paid to authenticity of the repairs in relation to the style in which the building was originally constructed. Ruskin opposed the indiscriminate tearing down and the so-called renovation of ancient buildings. He was supported in this by William Morris.

Morris was what might be termed a "complete" craftsman, who derived great pleasure from deep involvement with a particular craft. Through the use of his intelligence and skill in handworking, he was able to effect improvement in most of the crafts of the time.

"Ruskin theorized: Morris demonstrated,"[1] and in some ways it might be added that Carlyle indicated the faults to which the others dedicated themselves.

In 1857 Morris rented unfurnished rooms and when trying to obtain furnishings he found that industrialization had had a profound effect upon the aesthetic qualities of furniture manufacture - that "joinery is neither so sound nor so artistic as it was in the early Georgian era. A cheap and easy . . . ."[2] (The above quotation confirms what Carlyle and Ruskin foresaw - the loss of the individual touch of the worker to the faster production of the machine).

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[1]Triggs, p. 62.

[2]Charles Locke Eastlake, Hints on Household Taste in Furniture, Upholstery and Other Details (London: Longman & Green & Co., 1872, reissued by Benjamin Bloom Inc., N.Y., 1971), p. 4.

Morris was, as well as an artist and craftsman, a social reformer who followed Ruskin in this field. He was also a poet and manufacturer. He practised complete involvement. For example, when he designed his "Red House" in 1859, he also designed the furniture and planned the gardens for it; when he became involved in book-binding he also became involved in graphic arts and designed his own type styles for the printing of the book. The breadth of his talents is illustrated in the following quotation:

> To him the house beautiful represented the visible form of life itself. Not only as a craftsman and manufacturer, a worker in dyed stuffs and textiles and glass, a pattern designer and decorator, but throughout the whole range of life, he was from first to last the architect, the mastercraftsman, whose range of work was so phenomenal and his sudden transitions from one to another form of productive energy so swift . . . unperplexed by artificial divisions of art, and untrammelled by any limiting rules of professional creation.[1]

In 1861 a firm of artist-craftsmen was formed with Morris as the practical manager. The intention was to design and manufacture fine art fabrics. In 1881 the firm moved to Merton Abbey and on its circulars were listed twelve different kinds of work which the firm performed:

1. painted glass windows
2. arras tapestry woven in the high-warp loom
3. carpets
4. embroidery
5. tiles
6. furniture
7. general house decorations
8. printed cotton goods
9. paper hangings
10. figured woven stuffs

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[1]Triggs, p. 64.

11. furniture, velvets and cloths
12. upholstery.[1]

"He [Morris] had initiated a genuine revival of art industry and was instrumental in forming a school of designers and makers."[2] In 1888 an Arts and Crafts Exhibition Society was formed. The work of this society has been credited with creating an awareness of, and demand for:

1. better instruction in the afts and crafts
2. a higher type of art product.[3]

The Arts and Crafts Exhibition Society was a result of the work of Ruskin and Morris. The combination of the Arts and Crafts and the need for total involvement of the artist/craftsman was one of the important features of the work of these two men.

Perhaps one fault which grew out of the work of these artist/craftsmen is the widely accepted belief that an article has to be hand made to be of good quality. It is interesting to speculate on what might have been, had the emphasis been on the improvement of design of machine-made articles.

The growth of the Arts and Crafts Movement may be gauged by the fact that in 1904 Mr. L. Price speaking to the 11th Annual Convention of the Eastern Manual Training Association in Philadelphia stated:

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[1]Bennett, History of Manual and Industrial Education 1870 to 1917, p. 297.

[2]Triggs, p. 85.

[3]Bennett, History of Manual and Industrial Education 1870 to 1917, p. 298.

There are today two thousand arts and crafts associations in the United States.[1]

It has been recorded by Bennett that in 1896 the London County Council made provision for instruction in design and a number of handicrafts.[2] This provision was manifested in the form of a school whose specific purpose was to provide further instruction to apprentices, particularly that type of instruction the apprentice would not receive in his daily labors at his particular craft. It was not intended as a means through which people could enter the industry without first working in the particular craft field.

Because of the type of student that attended this school most of its classes were conducted in the evenings. The school was initially staffed by craftsmen and specialized techniques were able to be taught.

In 1908 the Central School of Arts and Crafts was moved from its original temporary quarters to its own building.

Summary

The Arts and Crafts Movement grew as a protest against the social and industrial conditions of the time and was a genuine attempt to recognize the individual potential of the worker. There is no doubt that Carlyle, Ruskin and Morris by their philosophical views and humanistic feelings each contributed to the ideas that there

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[1]William L. Price, "The Attitude of Manual Training to the Arts and Crafts," an address given to the Eastern Manual Training Association, Manual Training Magazine, 6:36, October, 1904.

[2]Bennett, History of Manual and Industrial Education 1870 to 1917, p. 298.

should be pleasure in work; that conditions of the time were dehumanizing the worker, and a return to the craftsman idea was desirable in preference to the mechanization and industrialization they could see around them.

The educational aspect of the movement came to fruition in 1896 with the establishment of a school. This was initially staffed by craftsmen and was basically for persons working in the crafts, but it became the educational stepping off point for a movement which was to later affect general education in England and America.

AMERICA - MID 19TH CENTURY TO 1920

Introduction

Manual training was introduced into the United States late in the 19th century and developed into what came to be known as industrial arts. There has been over the intervening years no clear cleavage from one form of manual education to another. For example, it was customary, and certainly many examples of this are available in the Manual Training Magazine and other periodicals of the earlier era, to use the terms manual training, manual arts and industrial arts somewhat synonymously. Because of the overlapping of the various forms of manual education, no clear time division is recognizable. This unit will cover the approximate period 1850 to 1920. The choice and use of this time period allows for the formation of a clearer view of the evolution of the conditions under consideration.

It is intended to describe in general terms the conditions that existed both in the social and industrial settings of the 19th century and early 20th century. It is not intended to treat in detail the specific influences of politics, economics, philosophy, etc. of the Civil War and the First World War, or of the two depressions of 1873 and 1896. Towards this end there will be three broad categories of social conditions, urbanization and industrialization. After considering these three aspects, an educational response of the late 19th century will be considered; followed by the beginning of industrial arts in the 1920's.

Societal Conditions

Even though America had been settled by Europeans for several hundred years there were still at this time vast tracts of land which had not been settled. The idea of scientific farming did not really develop until late in the 19th century - about the time of the closing of the frontier - when it was no longer possible for people to keep moving West to take up new properties.

Because of the abundance of water ways and the navigability of the Great Lakes, water transport was initially prominent. However, after the successful demonstration by Stevenson of the steam powered locomotive, huge developments took place within a relatively short period of time, so much so that by 1840 there were 3,328 miles of railroad tracks. During the decade of the 1840's this was increased to 8,879 miles and then during the 1850's, to 30,600 miles. By 1906 the railroad had extended to a length of 228,000 miles.[1] The role of the railroads in assisting the westward movement of people should not be underestimated. They provided the means of transport and quite often the opportunity for people to travel West and to take up property. This is particularly true in relation to immigration.

Of interest are the transcontinental railroads, the first of which was completed in 1869. The companies involved, as well as receiving the usual land grants, were also given financial assistance

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[1]Alex Groner and the Editors of "American Heritage" and "Business Week," The American Heritage History of American Business and Industry, ed. Alvin M. Josephy, Jr. (New York: American Heritage Publishing Co., Inc., 1972), p. 128.

in the form of second mortgage loans for each mile of track laid. The actual amount paid in subsidy depended on the type of terrain being traversed. Similarly other railroads which were pushing further West were generally offered land grants in accordance with the number of miles of railroad established. This proved to be important in a number of ways. It provided the incentive to the railroad companies to build more railroad and it also allowed the railroads to sell land to immigrants and construction workers. Generally this was a package deal, particularly for the immigrants. They were transported at a reduced rate and then sold railroad land to set up a farm.

> Transcontinental railroads pushed out into the plains in advance of settlers, advertised for immigrants in the eastern states and Europe, transported them at reduced rates to the prairie railhead, and sold them land on credit. Thousands of construction workers became farm hands, obtained free homesteads from the Federal Government, and bought tools, horses and cattle with their savings.[1]

The railroad was necessary if the country were to be developed. It provided the means for the transportation of goods and people over long distances. As an example of time saved, the first transcontinental railway reduced a journey of several months to approximately eight days.

There were in the 1870's a number of inventions which greatly improved both the efficiency and safety of the railroads. The Pullman sleeping car offered passengers the opportunity of gaining some form of rest on a long journey. There followed in quick succession the safety coupler and the Westinghouse air brake. An important

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[1]Samuel Eliot Morison and Henry Steele Commager, The Growth of the American Republic, II (New York: Oxford University Press, 1962), p. 744.

development during the 1870's was the refrigerator car. Initially it was involved with the carriage of beef from Chicago to the larger centers of population on the East. It was not long before it was adapted to the transportation of fruit and vegetables, allowing Californian fruit and vegetables to be competitively sold in the eastern states. Because of the great distances to be traversed, the railroad provided an invaluable service in maintaining a relatively cheap form of transport which was essential if crops and foodstuffs were to be sold economically at the market.

Between 1850 and 1920 the population of the United States increased from 23,191,876 to 106,021,537.[1] This continuing increase, as illustrated in the graph in Figure 6, was due to the three factors of high birth rate, decreasing death rate and immigration.

There had been a constant flow of immigrants into America since the early 19th century. Even during the first two years of the Civil War the flow of immigrants only reduced by about two thirds of what it had been immediately prior to the war. A graph illustrating the flow of migrants and covering the period 1850 to 1914 is shown in Figure 7.

The immigrants' presence had been desired for various reasons at various times. There were stages when he was much despised by certain groups, but highly sought after by others; particularly during periods of industrial unrest. To create an

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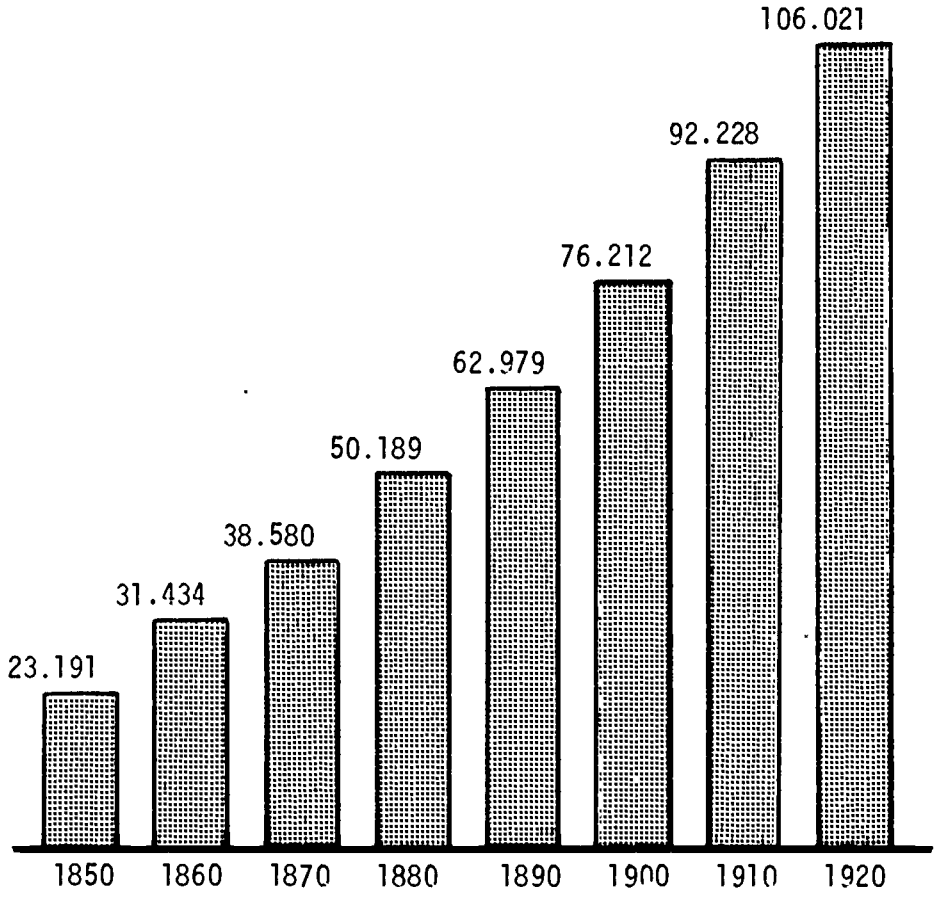
[1]U.S., Bureau of the Census, Census of Population: 1970, Vol. I, Characteristics of the Population, Part I, United States Summary, Section 1, (Washington: Government Printing Office, June, 1973), p. 1-42.

Figure 6

United States Population, 1850 to 1920
(expressed in millions)

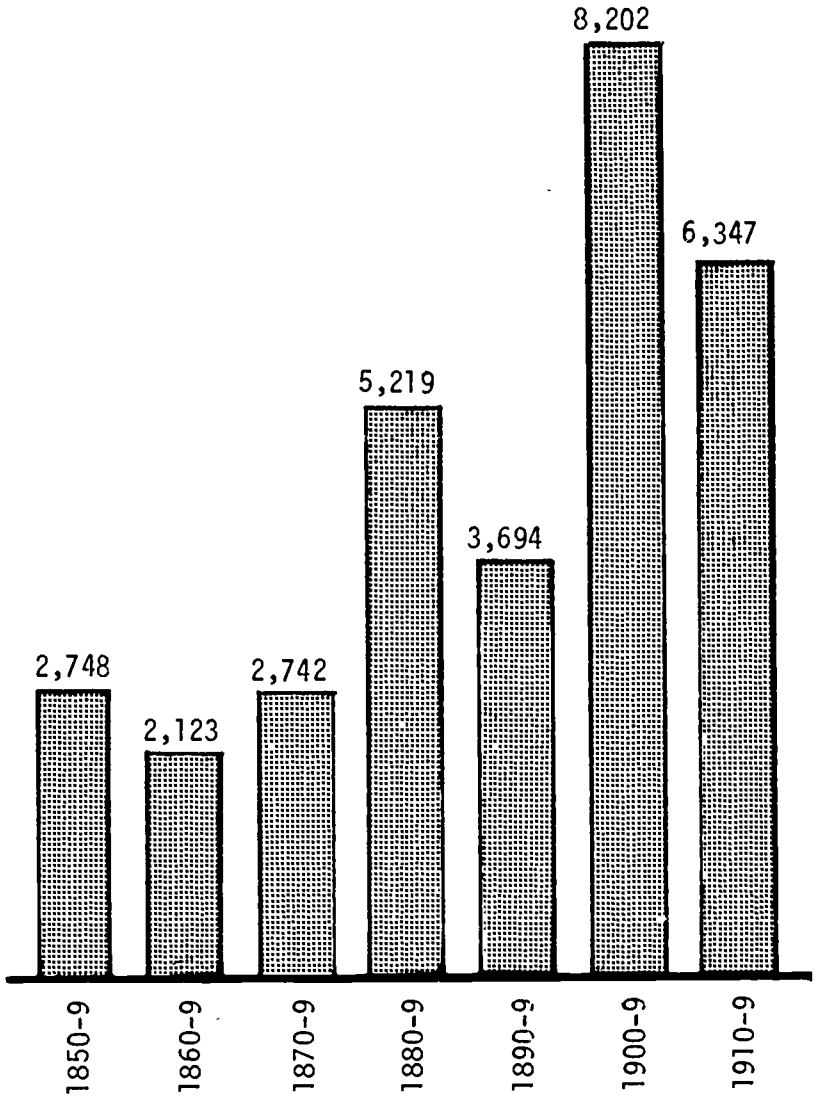


Source

U.S., Bureau of the Census, Census of Population: 1970, p. 1-42.

Figure 7

United States - Immigrants, 1850 to 1919
(Figures are approximate and
expressed in thousands)



Source

Jeremiah W. Jenks and W. Jett Lauck, The Immigration Problem: A Study of American Immigration Conditions and Needs (5th ed., rev. and enl. by Rufus D. Smith; New York: Funk & Wagnalls Company, 1922), Chart 1, p. 608a.

expanding labor force it was necessary to encourage large groups of immigrants to come to America. In the 1860's a company known as the American Immigrant Company came into existence. The American Immigrant Company, to use its own words, will thus "be an efficient channel of intercourse between the man in America who wants help and the man in England who wants work."[1] Two points of interest emerge from this quotation. These thoughts were expressed at the end of the Civil War in 1865, and despite the fact that the English had been siding with the South, there was still a movement to accept English migrants. The other point of interest is the reference to the "man in America who wants help." The inference taken is that the man who needed help was the employer or factory owner and it was he who used the migrants in his fight with the unions over wages and conditions.

By the mid 1800's, with the expansion of agriculture, the United States was fast becoming one of the leading economic powers in the world. She was by this time agriculturally self-sufficient and had assumed the position of standby grain supplier for Europe. There were always sufficient reserves of grain to meet export demands. The earlier development of transport was now a valuable asset to the country, for the grain could be railed to the Great Lakes area and then shipped overseas.

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[1]John R. Commons and others, eds., A Documentary History of American Industrial Society, Vol. IX, Labor Movement (Cleveland, Ohio: The Arthur H. Clark Company, 1910), pp. 66-67, citing "Report of Mr. Thomas D. Shipmen on the State of the Labor Market, etc. in New York," from the Annual Report of the Minister of Agriculture of the Province of Canada for the year 1865. In Sessional Papers for 1866, No. 5, pp. 83-84.

There had been some mechanization of farming by the "fifties." One of the outstanding developments was the introduction of Cyrus McCormick's reaper, which allegedly allowed one man to do the work of five. The constant struggle to reduce the amount of manpower required in relation to unit production has been a feature of agricultural and industrial developments in America. America, through involvement in world markets, found it necessary to compete with other countries. Productivity per worker became a major item in the cost structure and has remained so even today. From the 1850's onwards American agriculture was to be subjected to four impacts which were to have a profound effect on the future. In 1861 the first effects of the Civil War were felt when young workers joined the army. In order to maintain production, further mechanization was introduced. Next there was the continuing expansion westward and the progressive introduction of new farming areas. Morison and Commanger record that between 1860 and 1890 more land was brought under cultivation than in all the previous history of the nation.[1] The acreage increase is illustrated in the graph, Figure 8.

The quantity of harvested grain increased, because of better farming techniques and a greater area under cultivation. This left the established farmer in a less effective position, and brought on in some cases a depression for farm produce within the established areas.

The rising tide of population throughout the world brought on largely by improved health standards and reduction in the mortality

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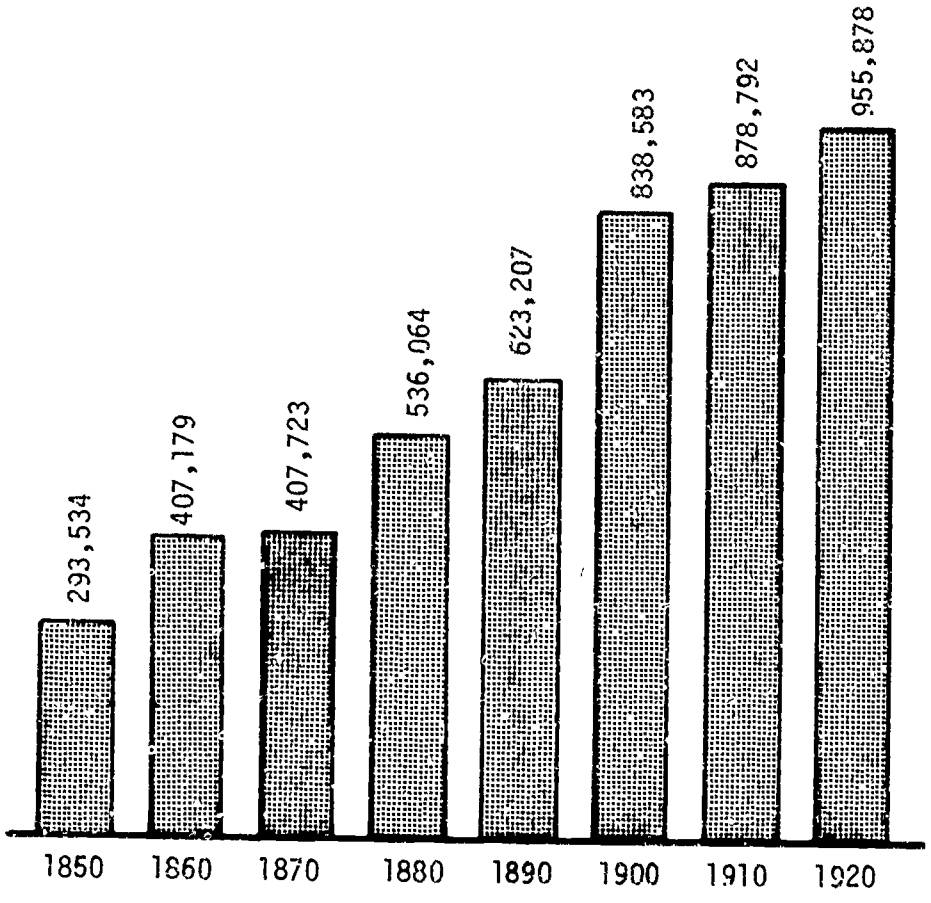
[1]Morison and Commanger, p. 278.

Figure 8

United States - Land in Farms, 1850 to 1920
1,000 Acres



Source

U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1967 (Washington: Government Printing Office, 1960), p. 278.

rate, increased the size of world markets, and in turn, created the demand which allowed the expansion westward to continue within America. Concurrent with this growth of world markets was the impact of new machinery and new and better types of crops. These were more suited to conditions in America and able to withstand the extremes of conditions to which they were subjected. Generally these produced a far higher yield per acre than the older varieties. The introduction of new grain types, the closing of the frontier, the nonavailability of cheap land and the constant pressure for greater productivity led to more scientific or intensive methods of farming.

When McCormick established his factory for producing his reaper and other farm equipment, he showed his business acumen by allowing the farmers to take the machines for a small initial payment and permitting them to make the further payments after the crop had been harvested and sold. Another improvement in 1877 was the perfection of the Oliver Chill Plow. This was followed in 1878 by other mechanical inventions, such as Appleton's twine binder and the steam threshing machine, which that year was perfected to the point where it could be used with safety and efficiency.

In the same decade, the 1850's, the value of farm machinery increased from $7 million to more than $20 million. Factory plows almost completely replaced the blacksmith's product, and John Deere's factory alone produced 13,000 plows for the western prairies in just one year - 1858. Business was good - Cyrus McCormick had become a millionaire by 1860, but farm machinery sales were yet to get their biggest boost from the Civil War, which as mentioned before, cut into

farm manpower by taking the young men off to fight. "Without McCormick's invention," said Edwin M. Stanton, Lincoln's Secretary of War, in 1861, "I feel the North could not win."[1]

The continually expanding use of machines and the effort to reduce cost per unit production illustrates the faith that people had in the machine's capability to increase profits. The value of farm implements in use throughout the U.S.A. increased from $246 million in 1860 to $750 million in 1900 and further increased to $3,959 million in 1920.[2]

The twentieth century saw another type of mechanical revolution in relation to agriculture and this was the application of the gasoline engine and electricity to farm machinery and equipment. The gasoline tractor was used to haul the combines for harvesting, a task previously requiring twenty to thirty horses. The popularity of the gasoline tractor as a work machine is illustrated in the graph, Figure 9.

By 1920, mechanization of agriculture was a well established practice. It helped overcome a labor shortage and improved the cost effectiveness of the farms. The rural population in 1920 was 48.8% of the total population. There had been a constant decline in this percentage from the 1850's when the figure had been 84.7%.[3]

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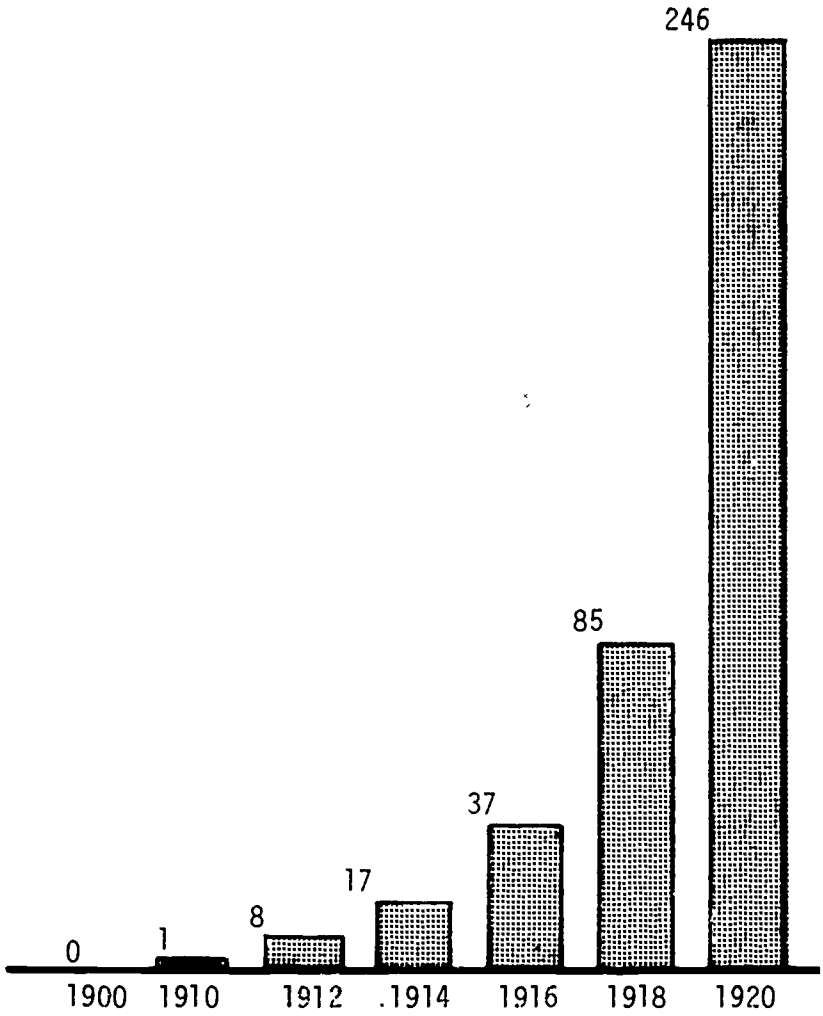
[1]Groner, p. 117.

[2]U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, p. 285.

[3]U.S., Bureau of the Census, Census of Population: 1970, p. 1-42.

Figure 9

United States - Gasoline Tractors, 1900 to 1920
(expressed in thousands)



Source

U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, p. 285.

Urbanization

In each country studied, concomitant with an increase in manufacturing there was an increase in urbanization. The growth of fifteen of the largest cities in America since 1860 is shown in Table 2.

Table 2

America - Growth of Fifteen Selected Cities, 1860 to 1920

(Figures are x 1,000)

	1860	1870	1880	1890	1900	1910	1920
New York	806	942	1206		3437	4766	5620
Philadelphia	563	674	847		1293	1549	1823
Brooklyn	279	420	599				
Chicago	109	299	503		1698	2185	2701
Boston	178	251	363		560	670	748
St. Louis	161	311	351		575	687	772
Baltimore	212	267	332		508	558	733
Cincinnati	161	216	255		325	363	401
San Francisco	57	149	234		342	416	506
New Orleans	169	191	216		287	339	387
Washington, D.C.	61	109	178		278	331	437
Cleveland	43	93	160		381	560	796
Pittsburgh	49	86	156		451	533	588
Buffalo	81	118	155		352	423	506
Detroit	46	80	116		285	465	993

Source

The above figures were taken from two different sources. Those from 1860 to 1880 were extracted from:

Jeannette P. Nichols and Roy F. Nichols, The Growth of American Democracy (New York: D. Appleton-Century Company, Inc., 1939), p. 309.

Figures from 1900 to 1920 were from:

U.S., Bureau of the Census, Census of Population: 1970; figures extracted from appropriate state volumes.

Nichols and Nichols state that about 1860, "culturally as well as economically the East dominated the post war nation."[1] This is easy to accept when it is realized that much of the West had not been developed at this time. It is illustrated in Table 2 that by 1880 there were fifteen cities with populations exceeding 100,000. There are reports that conditions in these larger cities were little different from those reported in other countries at a similar stage of industrialization. The rapid growth of the city presented severe problems relating to health and hygiene.

> The pushing of natives and foreign workmen into cities, places of relatively small area, totally unprepared for such an influx, starkly revealed the discomforts and dangers of life in such surroundings. The habits of immigrant workmen tended to lower the standards of all workmen, with the evil further aggravated by employees lately from the country, unschooled in the challenge the city makes to sanitation and content with crude facilities tolerable only in open spaces amply aired by sun and wind. Filthy streets, bad sewage and public pumps invited epidemics of disease, while the cheaply constructed tenements stood waiting to serve as tinder in gigantic conflagrations.[2]

The principle of making quick wealth often found its way into areas such as local government and in cases of urban growth there appears to have been ample scope for infiltration by people interested in these types of operations. People who had long established themselves in the cities and were somewhat comfortably situated, were afflicted with what we today would term apathy and were more intent on going about their private affairs than with becoming involved in the unpleasant and distasteful side of life,

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[1]Nichols and Nichols, p. 309.

[2]Nichols and Nichols, p. 309.

leaving matters of this type to the politicians. In turn the politician quite often was far more concerned with the potentialities that any of these situations might provide for graft than he was with the welfare of the citizens involved.[1]

Attempts had been made to provide unfiltered water supplies and as early as 1850 there were some eighty three such systems, while by 1860 the number had risen to one hundred and forty eight.[2] These still did not meet the requirements of the average people and the big majority at that time still depended on well water for drinking purposes. There were recurrent outbreaks of diseases such as cholera, yellow fever, typhus and smallpox. These, of course, were encouraged by the crowded and unsanitary urban areas.

A series of fires in Chicago, Boston and Portland brought home the need for more planning in relation to city life. As a result of these conflagrations, major programs were undertaken in relation to sewerage, water mains and paved streets. In addition, the police force was enlarged and professional firemen were employed. The overcrowded conditions, while dehumanizing and undesirable do not represent the total picture of life in the latter part of the 19th century.

> Families of small means sat down to a supper in a kitchen near the "cookstove"; it might now boast a

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[1]Nichols and Nichols, p. 310.

[2]George Rogers Taylor, The Transportation Revolution 1815-1860, Vol. IV, The Economic History of the United States (New York: Holt, Rinehart & Winston, 1966), p. 392.

> steam cooker, double boiler or other new utensils such as the lighter iron with a cool, removable handle invented by Mrs. Potts to replace the old heavy, hot sad-iron.[1]

Schneider, writing in his book Industrial Sociology implies that the ten hour working day had been achieved before the Civil War,[2] while Louis M. Hacker in The Triumph of American Capitalism, states: "At the beginning of the Civil War, the average working day for the American laboring population was eleven and a half hours."[3]

Conditions tended to fluctuate in relation to market conditions and labor supply. Although Federal employees had an eight hour day granted in 1868, this was not the case of private employees. The depression of 1873 put the worker in a disadvantaged position and caused, in 1877, a serious strike among railroad workers. The cause of the strike was a series of wage cuts coupled with longer working hours. Skilled workers were receiving between $1.35 and $1.58 for a day of fifteen to eighteen hours. The range of conditions throughout industry can be seen by the fact that in 1919 there were steel mills still working a twelve-hour day.

The role of children in the labor market is illustrated in the following quotation:

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[1]Nichols and Nichols, p. 416.

[2]Eugene V. Schneider, Industrial Sociology: The Social Relations of Industry and the Community (New York: McGraw Hill Book Company, Inc., 1957), p. 210.

[3]Louis M. Hacker, The Triumph of American Capitalism: The Development of Forces in American History to the End of the Nineteenth Century (New York: Simon and Schuster, 1940), p. 277.

> Children of the poor, however, often knew nothing of play or the country. A million boys and girls between ten and fifteen years of age were by 1880 a part of the ranks of labor; and by 1900 they had increased to one and three quarter million. Textile mills, stockyards, newspapers selling and sweat shops chained them. Few laws against child labor were enforced; children of Italian immigrants were sold into slavery as beggars. To combat some of these slum abuses, city people formed during the eighties societies for the prevention of cruelty to children.[1]

Industrialization

Discoveries of "natural resources" have been of major importance in the development of manufacturing industries. It has to be borne in mind that America is a country which has been richly endowed with most of the natural resources she requires, and that the tendency has been because of the vastness of these resources, to use them in large quantities, and when one area is "worked out" to move on to a fresh supply. One early discovery worthy of note was oil, brought about by the drilling of wells for salt water, presumably because of the high demand for the use of salt as a food preservative. The people operating these wells tended to become somewhat disappointed when a black, sticky substance would appear in the salt water, because at that time salt was a precious commodity. About that time Canadian shale oil was being used for illumination purposes and it was not long before this oily substance was adopted for the same purpose. It was found to have a disagreeable odor. However, it was only a short step from this stage to the inexpensive distillation process which made oil

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[1]Nichols and Nichols, p. 417.

a commercial proposition for illumination. The value of oil as a lubricant was clearly recognized, particularly in England, shortly after its discovery in the late 1850's. Once its value had been realized, drilling for oil commenced on a large scale and by the early 1860's it has been recorded that oil was as cheap as ten cents a barrell. The value and extent of the oil industry was realized with the development of the gasoline internal combustion engine.

Another discovery of some note, which also at the time did not fully attain its true significance, but had to wait for the development of the automobile, was that of vulcanizing rubber. The process was initially patented in 1844 by Charles Goodyear.[1] The growth of the rubber processing industry is illustrated in the graph, Figure 10.

Inventions in communications have been an important aspect of the American life style. These include Morse code (Samuel Morse), the typewriter (Christopher L. Sholes and Carlos Glidden) and the telephone (Alexander Graham Bell). These types of inventions possibly emanated because of the vastness of the country and the need to have a means of communicating quickly. Another step in mass media communication was the construction in 1866 at Philadelphia of a ten acre, million dollar plant for the making of paper from wood pulp.[2] To celebrate the opening of this plant a demonstration for

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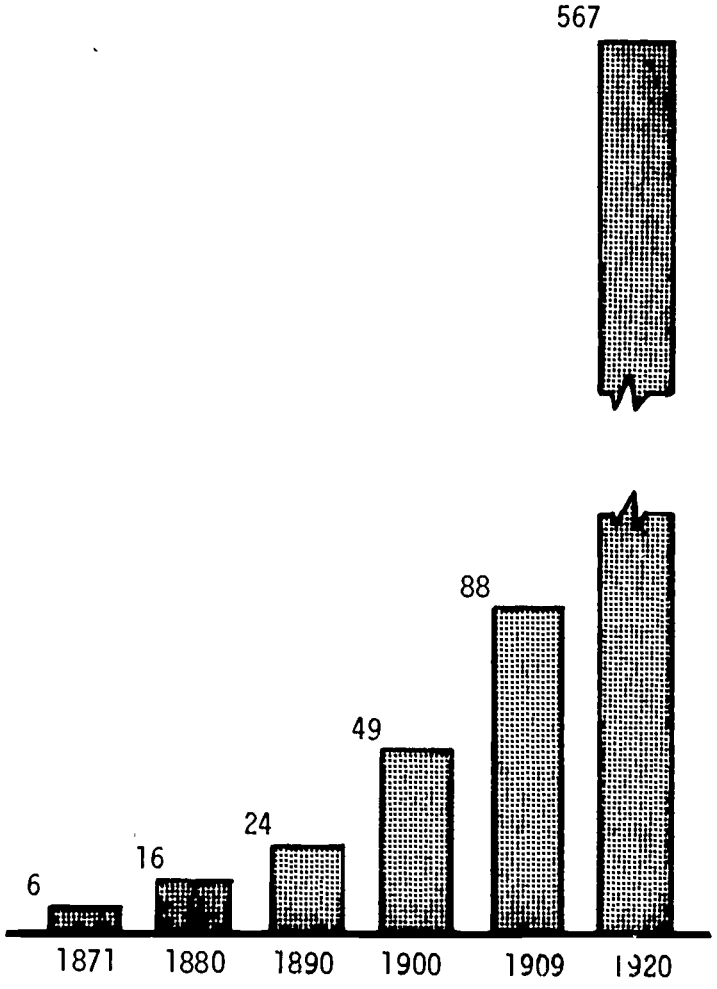
[1]Witt Bowden, The Industrial History of the United States (New York: Augustus M. Kelley, 1967), p. 269.

[2]Bowden, p. 269.

Figure 10

United States - Rubber Imports, 1871 to 1920
(expressed in million lbs.)



Source

U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, p. 548.

newspaper editors and publishers was arranged. This was conducted over a five hour period, and a nearby tree was felled and converted into print paper.[1] This, of course, heralded the way for the introduction of large quantities of cheap print paper which in turn allowed for the production of low cost newspapers.

The application of electricity to transport, lighting and power was also achieved during the latter part of the 19th century. The carbon arc was known and used as a source of light, but it was not until Edison produced the first inexpensive incandescent lamp, that electricity for home lighting gained wide acceptance and general use. Some idea of the spread of the use of electricity can be gained from the fact that in 1881 in New York there were eight central electric power stations. In less than two decades the number had increased to 2,744.[2] Electricity was adapted to public transport in Richmond in 1887 where Lieutenant Frank J. Sprague gave a demonstration in which he showed that his electric carriages not only travelled as expected along the rails which had been laid for them, but also could be moved simultaneously,[3] allaying fears that if one was operating, the others would be immobile. From this point onwards there was a widespread acceptance of the electric traction transport.

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[1]Bowden, p. 279.

[2]Arthur Meier Schlesinger and Dixon Ryan Fox, eds., A History of American Life, Vol. X, The Rise of the City 1878-1898 (New York: The Macmillan Company, 1933), p. 101.

[3]Schlesinger and Fox, p. 92.

As early as 1830 pig iron was being produced in the United States. In that year, in response to the demand for rails, engines and other iron products, 165,000 tons of pig iron were produced and by 1860 this amount had risen to a figure of 820,000 tons. Pig iron production continued to increase and by 1890 had attained a figure of 9,200,000 tons which was eleven times the production of 1860. Further increases occurred, until in 1920, the tonnage produced was 37 million tons, a fourfold increase over the 1890 figure.[1]

It is interesting to note the value placed on shipping through the Great Lakes. Iron ore, a necessary raw material for iron production was being supplied from the Lake Superior region and approximately one eighth of the ore for all iron being smelted was obtained from this area. This had increased to a proportion of one fourth during the decade from 1870 to 1880. By 1913, fifty million tons of a total of approximately sixty million tons were being supplied from the Lake Superior vicinity.[2]

It was shortly after the Civil War that the first Bessemer steel making process was brought into use in the United States. Its introduction was delayed no doubt, by the Civil War and also by the fact that at approximately the same time, an American, William Kelly had invented a similar type process. It was not until he and Bessemer came to an arrangement regarding patents that the Bessemer process was adopted. The figures, illustrated graphically in Figure 11, show the rise in production of steel from 1867 to 1920 and cover

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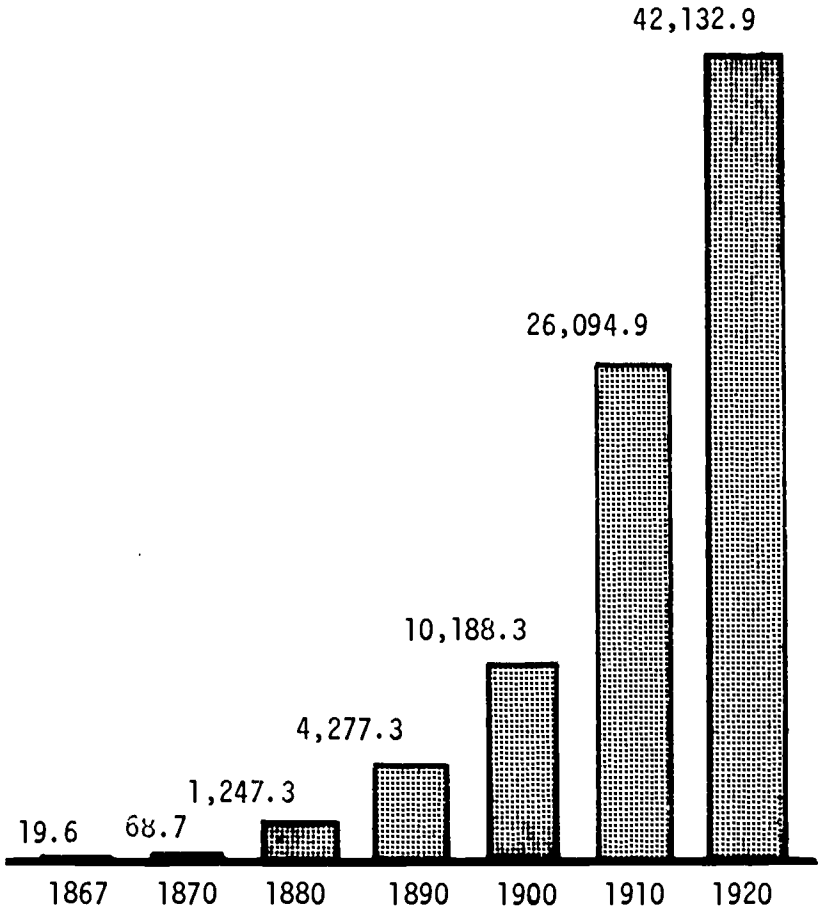
[1]Bowden, p. 325. [2]Bowden, p. 413.

Figure 11

Steel Production
(1,000 long tons)



Source

U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, pp. 416-17.

production by any or all of the open hearth, the crucible and the Bessemer processes.

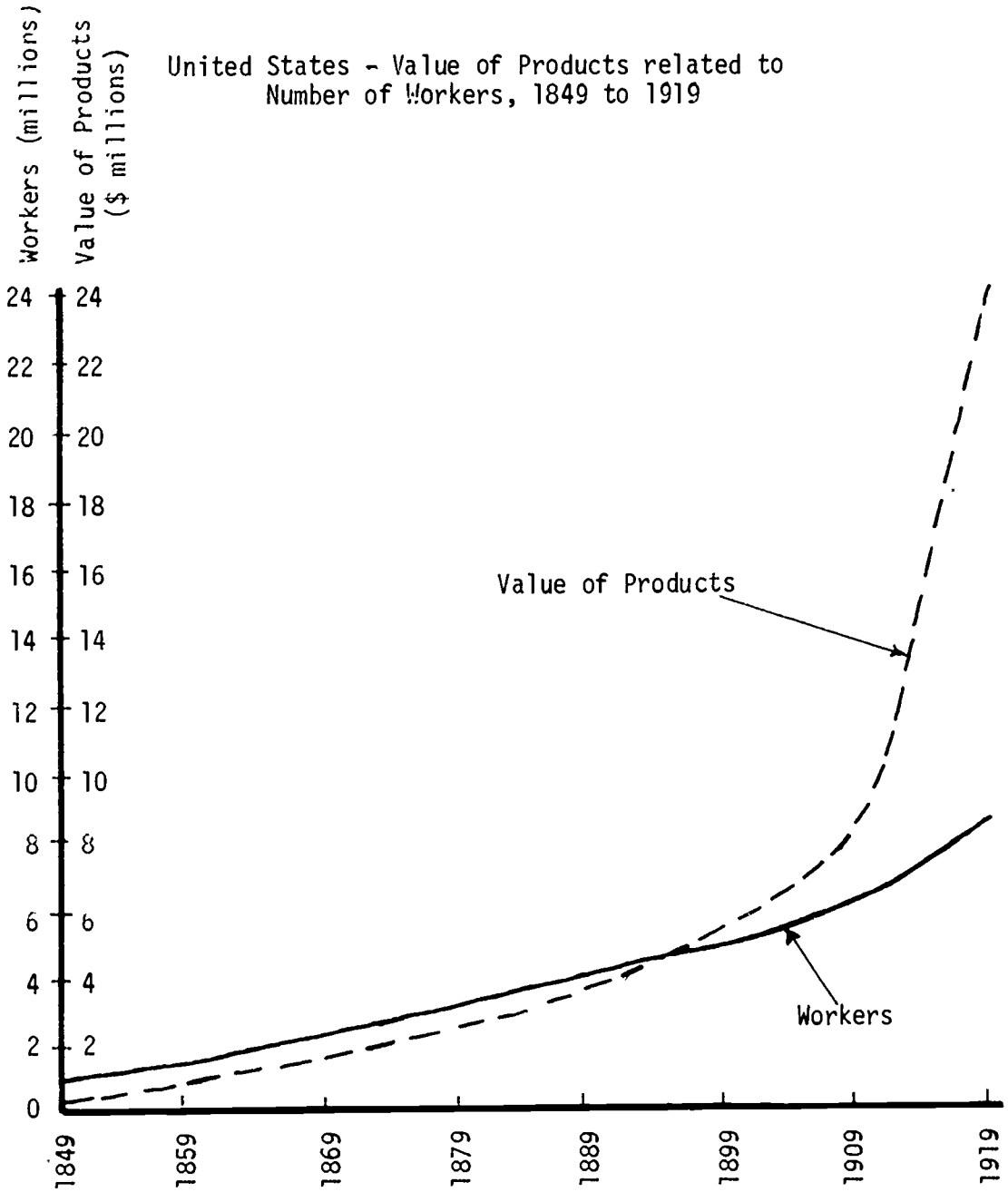
Another aspect of industrialization is that of manufacturing. Figure 12 shows the number of persons engaged n manufacturing and the value added by manufacturing industries. This illustrates that while the number of persons engaged in the manufacturing industry has increased approximately twelve times, the value of products has risen by approximately seven thousand times. It can be seen that productivity, which is a sought-after feature of American industry, has increased quite dramatically due to the use of machinery.

The principle of interchangeability of parts was developed by Eli Whitney. This paved the way for mass production where jigs and dies, once set up, could be operated by unskilled workers for the construction and assembling of mechanical items.

Henry Ford adapted the principles of interchangeability of parts to the production of automobiles and by so doing reduced the time of assembly from fourteen hours to one and a half hours per vehicle. Ford reasoned that there was little purpose in producing cars in such volume if there were no market. His action in increasing the wages of the workers, within limits, and reducing their hours enabled them to buy and use his automobiles. While this move produced opposition, both from shareholders and others employers, it did prove to be an outstanding business triumph. It was only a matter of time till most manufacturers adopted the mass production technique. The success of Ford's method can be judged by the

Figure 12

United States - Value of Products related to Number of Workers, 1849 to 1919



From 1849 to 1899 hand and neighborhood industries are included in the factory figure; from 1909 hand and neighborhood industries are excluded.

Source

U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, p. 409.

numbers of motor vehicles that have been produced. In 1910 the total of cars, trucks and buses sold from factories was 396,000. By 1920, sales had climbed to 2,227,000, showing an approximate six-fold increase in a decade.

An Educational Response - Manual Training

> For the introduction of the manual element in education to the United States we are indebted to the intellectual acumen of Dr. John D. Runkle, Ph.D., L.L.D.[1]

It was Runkle who discovered at the Philadelphia Exposition in 1876, the models which illustrated the Russian System. He had been for some time concerned that students came to the course of mechanical engineering at the Massachusetts Institute of Technology with little in the way of practical abilities. After graduation, to be able to enter the professional field, they would be required, in many cases, to work for one or two years as an apprentice. To Dr. Runkle this seemed to indicate a fault in the education system and it was to overcome this weakness that he had been searching for a method of instruction that would not involve the establishment of a manufacturing works. It was his belief that the introduction of such workshops was not in harmony with educational principles. After his discovery of the models at the Exposition, Runkle moved to establish a series of mechanic art shops or laboratories so that these arts could be taught in much the same way as chemistry and physics. He held to the belief that this discipline should be a part of general education.

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[1]Charles H. Ham, Mind and Hand: Manual Training the Chief Factor in Education (New York: American Book Company, 1900), p. 327.

In his report of 1876-77 Runkle explained the changes that had taken place in American life, referring to increased mechanization and the inadequacy of the apprenticeship system.

> There is a growing feeling that our public education should touch practical life in a larger number of points; that it should better fit all that sphere in life in which they [the students] are destined to find their highest happiness and well-being.[1]

In 1877 there arrived at the Massachusetts Institute of Technology a gift from the Czar of Russia. It consisted of eight cases of models which depicted the Russian System as it was devised at the Imperial School of Moscow.

Following Runkle's report, classes were established which were made compulsory for engineering students and elective for others. As well, a secondary grade school was opened to Grammar School students. Runkle's ideas regarding the principles to be followed when planning for instruction are illustrated in the following four points:

1. separate instruction shops from construction shops.
2. provide only one kind of work in each shop.
3. provide as many work stations and tools for each station as a teacher can reasonably handle in one instruction period.
4. graduate the instruction in each shop according to the difficulty of the operation.[2]

At about the same time Calvin M. Woodward was experiencing similar problems and when he endeavored to introduce the construction

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[1]Bennett, History of Manual and Industrial Education 1870 to 1917, p. 340.

[2]Melvin L. Barlow, History of Industrial Education in the United States (Peoria, Illinois: Chas. A. Bennett Co., Inc., 1967), p. 38.

of models to illustrate principles into his course, he came to realize that the students, in general, possessed little skills in relation to handworking activities. He became involved in finding a solution to this problem, and following Runkle's discovery immediately set about implementing a similar system. Woodward became the most outspoken supporter of the introduction of manual training into education. He successfully influenced a group of industrialists to finance his initial plan. The industrialists believed that they would benefit by obtaining a better trained worker as a result of this method of instruction. "On June 6, 1879, the St. Louis Manual Training School of Washington University was planned for boys of intermediate grades."[1] Woodward's support of the manual element in education was constant and sincere; he did not see the manual training school in either a role of technical education or as an industrial school. He believed that the type of work envisaged was far too elementary for technical training but should be suitable as ground work on which to build. He also envisaged the new discipline as being too wide and too open to be classified under the term of "industrial". The following quotation gives some insight into his views regarding this subject:

> In the manual training school the aim is not the narrow one of "learning a trade". Neither is dexterity sought or special operations which may be only small parts of even a trade. Neither is there any thought of manufacture with a view to selling something which will yield an income. The object of every feature is education in a broad and high sense.[2]

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[1]Barlow, p. 35.

[2]Calvin M. Woodward, Manual Training in Education (London: The Walter Scott Publishing Co., 1911), p. 61.

The following quotation is taken from the Prospectus of the school established by Woodward:

> One great object of the school is to foster a higher appreciation of the value and dignity of intelligent labor and the worth and respectability of laboring men. A boy who sees nothing in manual labor than brute force despises both labor and the laborer. With the acquisition of skill in himself comes the ability and willingness to recognize skill in his fellows. When he once appreciates skill in handicraft he regards the workman with sympathy and respect.[1]

Some conception of the principles behind Woodward's ideas can be found in the features below:

1. The shops should not compete with manufacturing shops.
2. Manual education should be broad and liberal.
3. Work will not be confined to saleable items.
4. If the student has learned well from his task or process he should be able to discontinue it.[2]

In an address to the National Teachers' Association at Saratoga, in July, 1883, Woodward outlined what he considered as "The Fruits of Manual Training."

> I [Woodward] claim as the fruits of manual training, when combined, as it always should be, with generous mental and moral training, the following:
>
> 1. Larger classes of boys in the grammar and high school.
> 2. Better intellectual development.
> 3. A more wholesome moral education.
> 4. Sounder judgments of men and things, and of living issues.
> 5. Better choice of occupations.
> 6. A higher degree of material success, individual and social.

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[1]Ham, p. 335.

[2]Calvin M. Woodward, The Manual Training School (Boston: D. C. Heath & Co., Publishers, 1887), p. 6.

7. The elevation of many of the occupations from the realm of brute, unintelligent labor, to positions requiring and rewarding cultivation and skill.
8. The solution of "labor" problems.[1]

In outlining manual training in an address delivered before the Social Science Association of Philadelphia in December, 1885, Woodward stated:

> "The education which the manual training school represents is a broader, and not, as the opponents of the new education assert, a narrower education."[2] We put the whole boy to school, not a part of him, and we train him by the most invigorating and logical methods. We believe that mental activity and growth are closely allied to physical activity and growth, and that each is secured more readily and more fully in connection with the other than by itself.[3]

Two major schools of thought existed regarding the introduction of manual training; those who thought of it in terms of trade or industrial training, and those who constantly emphasised what they considered to be the cultural value of constructive work. The former were widely supported in their view and quotations such as the following from a public school board, acted as reinforcement.

> The question of teaching trades in our schools is one of vital importance. If New England would maintain her place as the great industrial center of the country, she must become to the United States what France is to the rest of Europe. The first in taste, the first in design and the first in skilled workmanship. She must accustom her children from early youth to the use of tools, and give them a thorough training in the mechanic arts.[4]

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[1]Woodward, The Manual Training School, p. 203.

[2]The quotation in inverted commas was used by Woodward, but was not acknowledged.

[3]Woodward, The Manual Training School, p. 217.

[4]Frank Mitchell Leavitt, Examples of Industrial Education, (Boston: Ginn & Company, 1912), p. 12.

During the introduction of manual training, the first qualification sought in a teacher was skill in the use of hand tools. Row mentions the extreme case of one such mechanic in an attempt to emphasise that manual training teachers had inadequate preparation for their role in teaching:

> The first manual training school that the writer knew was put in charge of a carpenter, a man who for thirty years had done nothing but build houses, a man who knew practically nothing of school, of books, or of boys. The school lived less than half a year.[1]

The manual training idea had spread rapidly to the high schools in many cities and had become an accepted subject within the high school curriculum. By 1900 there were one hundred manual training high schools throughout the country. Dr. Henry M. Leipziger in an article in the National Education Association stated that:

> The manual training idea in education which has taken so deep a hold of the popular mind is not a sudden growth, but is a natural development of the social and industrial conditions of our time.[2]

Frank Ballou reported the results of a study he had undertaken and pointed out that administrators claimed the responsibility for the introduction of manual training. He quotes figures which show that two hundred and fifteen administrators claim that

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[1]Robert Keable Row, The Educational Meaning of Manual Arts and Industries (Chicago: Row, Peterson & Co., 1909), p. 36.

[2]Henry M. Leipziger, "Education as Affected by Manual Training," Journal of Proceedings and Addresses, National Education Association, Session of the Year 1892, held at Saratoga Springs, N.Y. (New York: National Educational Association, 1893), p. 439.

administrators were responsible for the introduction of manual training, while there were only fifty administrators who stated that manual training was introduced as a result of public demand.[1] The weakness in Ballou's figures was caused by his asking only administrators whether they or public demand were responsible for the introduction of manual training. McKinney in an article in the Industrial Arts Magazine states rather bluntly: ". . ., and fifty rather truthfully and frankly said it [manual training] was in the school because of a popular demand."[2]

The lack of clarity regarding the aims of manual training was illustrated in a study in 1916 - approximately thirty years after the introduction of manual training into the schools.

> In 1916, Joseph C. Park and Charles L. Harlan made another similar study covering 156 cities, and the report is published by the Bureau of Education as Bulletin 1916, No. 32, and is worth the study of all manual training teachers. On the question of aim, we find out of 112 cities which sent replies, 50% claim their aim as pre-vocational, 39% cultural, 11% as vocational.[3]

It seems that what Runkle and Woodward saw as being a deficiency in education, namely the need for students to develop an understanding and approach to practical problems, was probably the greatest single influencing factor.

As manual training became established and further thought was given to it, changes started to take place and the term manual arts

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[1]Frank W. Ballou, "Is Manual Training the Result of Pedagogical or Sociological Demand?" Manual Training Magazine, 9:17, October, 1907.

[2]James McKinney, "The What and the Why of Manual Training," Industrial Arts Magazine, 8:294, August, 1919.

[3]McKinney, p. 294.

came to be used synonymously with manual training. While it is not the purpose here to make the fine distinction between manual training and manual arts it does seem that the influences of both Sloyd and the Arts and Crafts Movement led to the developments and refinements which culminated in the conception of manual arts.

> The movement for instruction in the manual arts as a factor in education is not the response to a demand of genetic psychology alone; it is a natural outgrowth of the industrial era through which we are passing. Indeed, a close study of the history of the introduction of the manual arts into our system of public education will reveal the fact that they were first established in response to an economic argument and that the more profound reasons for their retention and development have been a result of the physiological and psychological research connected with the child study of recent years.[1]

In his book Exploring the Manual Arts, John Friese lists three commonly accepted manipulative aims:

1. to provide opportunity for boys to make and do things they like to make and do.
2. to provide training in common skills everyone should possess.
3. to provide trade exploratory or try-out experiences in typical trades to assist boys in finding and testing their interests and aptitudes.

He also lists five justifiable and achievable non-manipulative aims:

1. to provide training in industrial art and in industrial art appreciation.
2. provide a natural medium for guidance, educational and vocational.
3. to provide interesting technical information about the occupation or occupations represented in the school shop and others closely allied.

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[1]Solon P. Davis, "The Manual Arts in Extension Schools," Year-Book of the Council of Supervisors of the Manual Arts - 1904: Fourth Annual Meeting Hartford, 2-3 December, (Worcester, Massachusetts: The Davis Press, 1905), p. 152.

4. to provide studies in vocational economics closely related to everyday life.
5. to provide organized training in reasoning and problem solving.[1]

Manual training gained a wide and ready acceptance and was subjected to the evolutionary influences of teachers and experience.

> . . ., the character of the thing, and not its name, ought to concern us most, but in our estimation the term "manual training" has an honorable record and the term "manual arts" has met a real and a growing need in educational terminology.[2]

An Educational Response - Industrial Arts

> Is there a manual-training teacher in the country who does not increasingly feel the need for a more explicit and dignified title for his professional work?
> . . . . . .
>
> It is no longer merely a question of improving an indefinite title, but of replacing one that is inappropriate and incorrect in its implication. The old term is now not only vague, it has become misleading as an indication of the aim and character of our work.
> . . . . . .
>
> . . . . The industrial arts which stand for one of the most vital and important phases of modern civilization, throw away their claim to recognition by masquerading under a term at once inappropriate and misleading. Such a term is both an obstacle to the full and free development of our work and to its recognition and appreciation on the part of the public.[3]

These thoughts were expressed by C. T. Richards in an editorial in the Manual Training Magazine in 1904, and represent the first

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[1]John Friese, Exploring the Manual Arts (New York: The Century Company, 1926), p. 41.

[2]Charles A. Bennett, Editorial, "Origin of Term 'Manual Arts'," Manual Training Magazine, 15:309, 1914.

[3]C. T. Richards, Editorial, Manual Training Magazine, 5:32-3, October, 1904.

significant statement on the subject of a new name for manual training. Little appeared to happen despite the plea of Richards for a "vigorous discussion of this question"[1] until Dean James E. Russell in 1909 and Dr. F. G. Bonser in 1911 wrote articles which became the basis for industrial arts. As happens, others were involved in the field, but did not gain the recognition that has been accorded to these two men. Bonser, writing in The Industrial Arts Magazine in 1914 opened his discourse with:

> I note, and with great pleasure, that you call your new periodical The Industrial-Arts Magazine. I take it that it has to do with all those arts relating to the changes in materials by which they are made into finished products, thereby becoming more useful and more beautiful for the satisfaction of man's needs. This includes those changes in woods, metals, clays and other earth materials, textiles, food materials, and so on, usually called broadly, manufacture.[2]

He further indicated his feeling in relation to the name which should be used:

> The proposition which I wish to offer is, that the use of the term industrial arts, is much more desirable than either the term manual training or manual arts.
> . . . . . .
>
> Industrial arts is a content term, not a disciplinary term . . . .
> . . . Industrial arts is not to be thought of primarily for vocational purposes, altho its appropriate development will go far toward providing a foundation for vocational specialization, and especially as a basis for vocational guidance.[3]

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[1]Richards, p. 33.

[2]Frederick G. Bonser, "The Significance of a Name," The Industrial Arts Magazine, I, No. 2 (1914), p. 112.

[3]Bonser, p. 112.

Bonser is well remembered in the history of industrial arts for his definition, namely:

> The industrial arts are those occupations by which changes are made in the forms of materials to increase their value for human usage. As a subject for educative purposes, industrial arts is a study of the changes made by man in the forms of materials to increase their values and of the problems of life related to those changes.[1]

While Bonser was perhaps more concerned with the effects of industrial arts in the elementary school, his definition was far-sighted for its time, but its effect on the general teacher must be somewhat in doubt. It seems that there could have been a considerable time lag between the postulation of theories and the actual practical application, for in 1920 Clarence Everitt Howell wrote:

> It seems that just now we are in a tremendous transition stage, whether consciously or unconsciously, I do not know. The old methods have been tried and found wanting. Educators are questioning the correctness of our industrial work as it now exists in the schools. In the background stands the old, formal manual training, and in the foreground the later productive - activities type, - each the extreme opposite of the other.[2]

Although people were talking, and in some cases practising industrial arts, manual training and manual arts were still very much in evidence. In an editorial to The Industrial Arts Magazine in 1920 E. J. Lake and S. J. Vaughn wrote under the sub-title "Modernizing Manual Training":

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[1]Frederick G. Bonser and Lois Coffey Mossman, Industrial Arts for Elementary Schools (New York: The Macmillan Co., rpt., 1936), p. 5.

[2]Clarence Everitt Howell, "The Changing Aims of the Industrial Arts," The Industrial Arts Magazine, 9:305, August, 1920.

> The suggestions for modernizing manual training by making it expressive of the life and conditions of the times is in line with the best thought and practice not only in manual training but in the academic fields as well. . . .
> . . . . . .
>
> The modern movement is towards the investment of manual training with thought-content; the working out of problems that have a real bearing on life interests; the using of the tools of industry because there is an important job to be done, not the doing of a useless job because there are important tools to be used.[1]

Henry J. Sredl, identified as existing in the twenties, four methods of shop organization. They were the Ettinger Plan, the Gary Plan, the Russel-Bonser Plan (also known as Industrial-Social Theory) and the Pittsburg Plan. The Ettinger Plan drew its name from Dr. William L. Ettinger, formerly Superintendent of Schools in New York City and refers to a unit shop. The intention was that the student could be routed through a series of unit shops. The Gary Plan, which was developed under Superintendent William Wirt of Gary, Indiana, had as its basic idea the thought that students would gain industrial experience under the direction of experienced tradesmen. The experiences would be in the form of productive work. The Russell-Bonser Plan provided for composite or general shops where a student would be able to come into contact with various types of materials in the one shop. The Pittsburg Plan combined the Ettinger and Bonser Plans. A student would first go to a general shop where

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[1]E. J. Lake and S. J. Vaughn, Editorial, "Modernizing Manual Training," The Industrial Arts Magazine, 9:28-9, January, 1920.

he could discover his interests and once having made this discovery was then able to select the particular unit shop in which he would work.[1]

Industrial arts of the twenties is probably best remembered for the introduction of the general shop. This does not mean universal adoption, nor does it mean that the same approach was adopted wherever the general shop existed. Situations existed where students were allocated a set amount of time in each of several unit shops. In this way they supposedly obtained breadth of experience. By contrast, there also existed a shop in which tools suitable for several different types of work, were available at the one time. In this latter case two divisions became prominent. In one, the students were divided into small groups and assigned a project. They worked only in that particular area of the shop which was applicable to that project. Generally after a set period of time the groups were rotated so that all pupils were exposed to the various areas. This, of course, very closely resembles the idea of unit shops and the rotation of pupils through them. The other form of general shop was that which included the use of several different types of materials, and because the tools and equipment were available, any whole project could be completed in the one shop. E. J. Lake and S. J. Vaughn in another editorial outline some reasons for the all-purpose shop:

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[1]Henry J. Sredl, "Industrial Arts in the 1920's," The Journal of Industrial Arts Education, 25:33, May, 1966.

> The so-called "all-purpose" shop is steadily finding its way into the schools. It has some fundamental reasons for existence. The manual training workshop has been too narrow and confined. There is a place for a shop fitted with a kind of composite equipment where a variety of materials may be used and where different lines of related activity may be engaged in.
>
> . . . . . .
>
> We are not in sympathy with a movement which would make a great conglomeration and which anticipates the carrying of several and distinct lines in the same shop.[1]

Not only was there confusion regarding the types of manual education being offered, and the aims of each of these types, but also regarding terminology. As an example, popular magazines of the time carried articles which referred to exercise, project and the production method. To give clarity to these terms Kelley in 1925 referred to the exercise as being designed "to give practice in the principles and their application." He did also indicate that it had been largely abandoned by this time. In referring to the project, Kelley explained this as being "any constructive or repair activity carried to its conclusion, for which a real need has arisen in the life of the student." His explanation of the production method was that a class involved in producing a number of items could be divided into a series of small groups, each group being allocated the construction of some portion of the article. At each subsequent lesson the groups would rotate so that each student would obtain experience in making all parts of the completed object.[2]

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[1]E. J. Lake and S. J. Vaughn, Editorial, "The All-Purpose Shop," The Industrial Arts Magazine, 9:406, October, 1920.

[2]Denman Kelley, "The General Shop as a Junior High School Activity," The Industrial Arts Magazine, 14:171, May, 1925.

Snedden and Warner advanced "Objectives of the Junior High School Industrial Arts" as:

> Primary Controlling Purpose: Developmental experience through manipulative and other activities introductory to the various accessible phases of the world's industrial work.
>
> Secondary Aims, Objectives, or Values in greater or less degree:
>
> 1. Exploratory or finding studies for the detection or discovery of interests and aptitudes.
> 2. General guidance values through broad occupational contacts and studies.
> 3. Consumers' or utilizers' knowledges and appreciations; the better choice and use of industrial products.
> 4. Household mechanics or the development of "handyman" abilities.
> 5. Avocational activities of adolescent youth in the pursuit of hobbies, and in the construction of things to possess either permanently or temporarily.
> 6. Vocational purposes in the definite preparation for a future occupation (applicable to from 0 to 15 per cent of the average junior high school group).
> 7. Correlation with other studies and interests both in and out of school.
> 8. The forming of social habits; development of social values (moral, civic, etc.) possible in every activity of junior high school, but particularly in the industrial arts because of the socialized setting possible.[1]

The confusion on aims and terminology was cleared to some extent in 1934 with the report of the Committee, American Vocational Association. This report summarized twelve objectives in relation to industrial arts:

1. To develop in each pupil an active interest in industrial life and in the methods of production and distribution.

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[1]David Snedden, and others, Reconstruction of Industrial Arts Courses (New York: Bureau of Publications, Teachers College, Columbia University, 1927), p. 10.

2. To develop in each pupil the ability to select wisely, care for, and use properly the things he buys or uses.
3. To develop in each pupil an appreciation of good workmanship and good design.
4. To develop in each pupil an attitude of pride or interest in his ability to do useful things.
5. To develop in each pupil a feeling of self-reliance and confidence in his ability to deal with people and to care for himself in an unusual or unfamiliar situation.
6. To develop in each pupil the habit or an orderly method of procedure in the performance of any task.
7. To develop in each pupil the habit of self-discipline which requires one to do a thing when it should be done, whether it is a pleasant task or not.
8. To develop in each pupil the habit of careful, thoughtful work without loitering or wasting time (industry).
9. To develop in each pupil an attitude of readiness to assist others when they need help and to join in group undertakings (co-operation).
10. To develop in each pupil a thoughtful attitude in the matter of making things easy and pleasant for others.
11. To develop in each pupil a knowledge and understanding of mechanical drawing, the interpretation of the conventions in drawings and working diagrams, and the ability to express his ideas by means of a drawing.
12. To develop in each pupil elementary skills in the use of the more common tools and machines in modifying and handling materials, and an understanding of some of the more common construction problems.[1]

Although industrial arts made its first serious appearance on the scene towards the 1920's, manual training and manual arts were still in evidence. Despite the work of Russell and Bonser, and particularly the definition of Bonser and Mossman, there was still confusion regarding this new subject. Magazine articles of the late twenties continued to refer to manual training and manual arts. This

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[1]American Vocational Association, Standards of Attainment in Industrial Arts Teaching (Final Report of the Committee, as presented at the Pittsburgh Convention, Hotel William Penn, Friday, December 7, 1934), (Bloomington, Ill.: Pantagraph Printing and Stationery Co., 1935), p. 12.

indicates that while industrial arts had gained a foothold it had not "taken the country by storm", and was by no means completely accepted throughout the nation at that time.

Summary

America, over the period considered, was a nation developing a highly sophisticated industrial complex. It reached the stage before 1920 where farms had moved from self-sufficiency to industrial undertakings. Mechanization was proceeding rapidly and technology was being developed and applied in all facets of the life of the nation. The incoming migrant population helped to provide workers for this growing industrial setting, but in general, a need existed for people with mechanical abilities to keep the industries functioning. That industrialists were concerned about the abilities of their workers, was illustrated in their support of Woodward to establish the manual training school. They believed that the end product would be a better worker. The lack of clarity of aims of manual training caused a great deal of misunderstanding as to its true purpose in education. The educationalists who supported manual training, looked to cultural values as their justification, while those who opposed it did so on the grounds that it was vocational education and not general education.

As industrialization proceeded and became more complex, the needs of the worker changed from greater mechanical skills to learning to live in the developing complex society. To be able to understand this society, it was necessary for workers to know more about industry. The work of Russell and Bonser helped develop a

school subject which was directly linked with these needs. It grew naturally out of the existing manual subject, which by 1920 was stressing developments within the pupil more appropriate to the 1890's.

AMERICA - THE PRESENT

Introduction

It is intended within this section of the study to draw a composite picture of conditions as they exist at the present time, and to consider such features as transportation, mass media communications, and the increased use of household appliances in relation to present day life.

The study has the following divisions of societal conditions, urbanization, industrialization and an educational response, namely, industrial arts.

Societal Conditions

The changing distribution of rural/urban[1] American population has continued throughout its history and is still evident today. In 1960 the total population was 179,323,175, comprising 69.9% urban, 30.1% rural. By 1970 the population figure had risen to 203,211,926 and was classified as 73.5% urban, 26.5% rural.[2]

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[1]The Bureau of the Census has employed several definitions of urban population. According to the population adopted for the 1950 Census, the urban population comprises all persons living in (1) places of 2,500 inhabitants or more incorporated as cities, boroughs and villages, (2) incorporated towns of 2,500 inhabitants or more except in New England, New York, and Wisconsin, where the term "town" is used to designate minor civil divisions of counties, (3) the densely settled urban fringe, including both incorporated and unincorporated areas, around cities of 50,000 inhabitants or more, and (4) unincorporated places of 2,500 inhabitants or more outside any urban fringe. The remaining population is classified as rural.

[2]U.S., Bureau of the Census, Census of Population: 1970, p. 1-42.

> We live in an age of change and this change is accelerating. To illustrate, consider how we move around this planet. For almost 400,000 years, man moved only as fast as his legs would take him. For another 4,000 years he moved as fast as the animal he was riding. By the end of the 1800's, railroads moved him at about 60 miles per hour. By World War II, man could move at the rate of 300 miles an hour and today he can travel at speeds exceeding 18,000 miles an hour. This acceleration has likewise speeded up all aspects of life in our time. The rate of growth of scientific and technological knowledge has increased in the same mathematical proportion.[1]

There is ample evidence about us to support Feirer's contention that changes affect all aspects of life. It is in some ways difficult to see the relationship between life as it exists today and as it was in the 1920's. An examination of the home environment will give some idea of the immensity of the changes that have occurred since the early 20th century. The television set has wrought marked changes within our social life. As recently as July 1, 1941, NBC's New York station WNBT, and CBS's station WCBW, were licensed as the first commercial stations in the United States. Approximately thirty years later there exist six hundred and seventy television broadcasting stations. This indicates major growth in this form of mass media communication. The statistics show that in 1960, 86.7% of households possessed television sets. By 1970, 77.4% of households possessed black and white sets, while the figure for color television receivers was 37.8%. Just one year later, the number of sets had reached 77.6% and 44.3% respectively.

Some other factors which help to illustrate the growth of consumer items are automobiles, washing machines, clothes dryers,

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[1]John L. Feirer, Editorial "The Editor's Stand: Is Industrial Arts Relevant?" Industrial Arts and Vocational Education, 59:29, February, 1970.

refrigerators and freezers. The increases in percentage of households owning these items are shown in Table 3. There are also statistics which relate to items such as can openers, coffee makers, frypans, irons - steam and spray, electric mixers, vacuum cleaners and water heaters. While this list is by no means complete, these items point to our advancing technology and its application to the home situation. It should be borne in mind that as well as the benefits being brought to the home, there are also benefits to the manufacturing and service industries. There is a further inference; people generally are now in a much more favorable position to purchase these items than they would have been at the turn of the century. Radios have played a varying role within society. From the initial impact of the 1920's they grew in popularity up to the advent of television. Their popularity waned until the development of the transistor. Transistorized radios then found favor because of their portability. Telephones also have shown a rapid growth, from their introduction just before the turn of the 20th century, until in 1972 when there were 132 million telephones in operation.[1]

While these advances have helped to alter modes of living and while industrial techniques have enabled costs to be kept low, there are still sections of our population who live in sub-standard accommodation. We can find in existence today, particularly in urbanized areas, ghettos, overcrowded tenements and other undesirable features of city life.

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[1]U.S., Bureau of the Census, 1974 The American Almanac, 94th edition (Washington: Government Printing Office, September, 1973), p. 495.

Table 3

Percentage Households Owning
Cars and Appliances

	Cars		Television		Washing		Refrig-	Free-	Dish	Air
	1	2 or more	B&W	Color	M/c.	Dryer	erator	zer	Washer	Cond.
1960	75.0	16.4	86.7		74.5	17.4	86.1	n.a.*	4.9	12.8
1970	79.6	29.3	77.4	37.8	69.9	40.8	83.3		17.3	20.5
1971	79.5	30.2	77.6	43.3	71.3	44.5	83.3	32.2	18.8	31.8

*n.a. = not available.

Source

U.S., Bureau of the Census, 1974 The American Almanac, p. 332.

Life in the country improved markedly with the advent of the motor car and even more so after the sealing of roads. Since the 1920's technological innovations have provided for rural inhabitants, conveniences enjoyed by city dwellers.

As the motor car reduced the time of travel, so too has the aeroplane given further impetus to this reduction of time. We find now aeroplanes capable of carrying many hundreds of people at supersonic speed in great comfort and at relatively low cost. The interstate network of "superhighways" has influenced transportation of both passengers and goods. Bigger trucks and streamlined buses are a feature of daily life.

Urbanization

As the total population expanded and the percentage of rural population decreased, so did the urban or city areas grow in size.

With this growth numerous problems arose. Transportation has long been a problem within the cities. The motor car was hailed in New York as being a forward move for it eliminated the costly army of workers who were necessary to keep the streets cleaned of horse manure. But in time the automobile has presented its own pollution problem and one which is more severe than that created by the horse. With the growth of high-rise buildings and relatively narrow streets, there is a tendency for motor vehicle exhaust fumes to collect.

In an endeavor to overcome problems of moving people from one point to another in a city, the motor omnibus has been used, along with various forms of electric traction. At the present time experiments are being conducted in various forms of mass transit. Life in the city, in general, presents a picture of "comfortable" living with improved health standards, due in part to the enforcement by authorities of health regulations. The provision of sewerage or septic tanks and reticulated water supplies, where chemical purification is often used to overcome any deficiencies in the quality of the water, has contributed to the well-being of the community. Street drainage is provided to ensure that stagnant pools do not form. A greater understanding by the community of hygiene, together with improved medical knowledge and facilities, and a more ready access by the average person to the source of this medical knowledge have been combined to virtually eliminate outbreaks of the diseases that plagued early urbanization. In regard to living conditions, it would be difficult to find a situation today that exhibits the features prevalent in the early industrializing period. While ghettos and

overcrowded tenements are real problems that demand attention and solution, they are not representative of present day life throughout American cities.

Industrialization

Steel production in 1920 was recorded as 42,132,934 long tons.[1] In 1972 this had risen to 118,316,000 long tons (approximately).[2] There have been over the years, vast technological improvements to the steelmaking process, such as open hearth furnaces using an oxygen lance, the basic oxygen steel making process and continuous casting. These techniques have assisted in improving the output per man hour and at the same time giving greater control over steel quality. Concurrent with this growth has been development in metallurgical "know how". Element analysis of metal samples can be achieved by use of computers in very short periods of time and are a necessary concomitant with the new steel making techniques. The period of "burn" has been reduced to such a stage that it would be useless to have a slow sample analysis technique, for by the time the sample had been taken and analysed, the composition of the molten metal would have altered significantly and the sample would no longer be a true indication of the parent metal.

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[1]U.S., Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957, pp. 416-7.

[2]U.S., Bureau of the Census, 1974 The American Almanac, p. 729. (For comparative purposes the short ton figure has been converted to long tons.)

Manufacturing industries have continued the drive for productivity. From the graph, Figure 13, it can be seen that the total number of employees has risen from about 14 million in 1947 to approximately 18 million in 1967. During this same period of time the value of manufacturing has risen from about $17.5 billion to about $260 billion. Much of this is due to the constant search for, and adoption of, machinery which will give a higher output per unit of time.

The ideas of mass production have now become incorporated in the technologically advanced system of automation. This usually requires the starting of the machinery and some general supervision, but the processes themselves are invariably carried out by computer-controlled or programmed machinery.

> In one modern bakery, we are told, twelve automatically-controlled ovens are capable of producing sixty million crackers in an eight hour shift. In another factory engine blocks are handled from start to finish by automatic machines. One of the devices applies 1,344 cutting instruments and, like the others, automatically signals a "machine tender" or maintenance worker when any of the tools is nearing the point at which it will no longer provide the required accuracy.[1]

One of the most highly mechanized manufactures is the car industry. In 1972 there were 8,828,000 passenger cars listed as factory sales, while motor vehicle registrations totalled 118,618,000. Of this figure automobiles accounted for 96,949,000 and trucks and buses for 20,455,000.[2] An interesting corollary of this, and one

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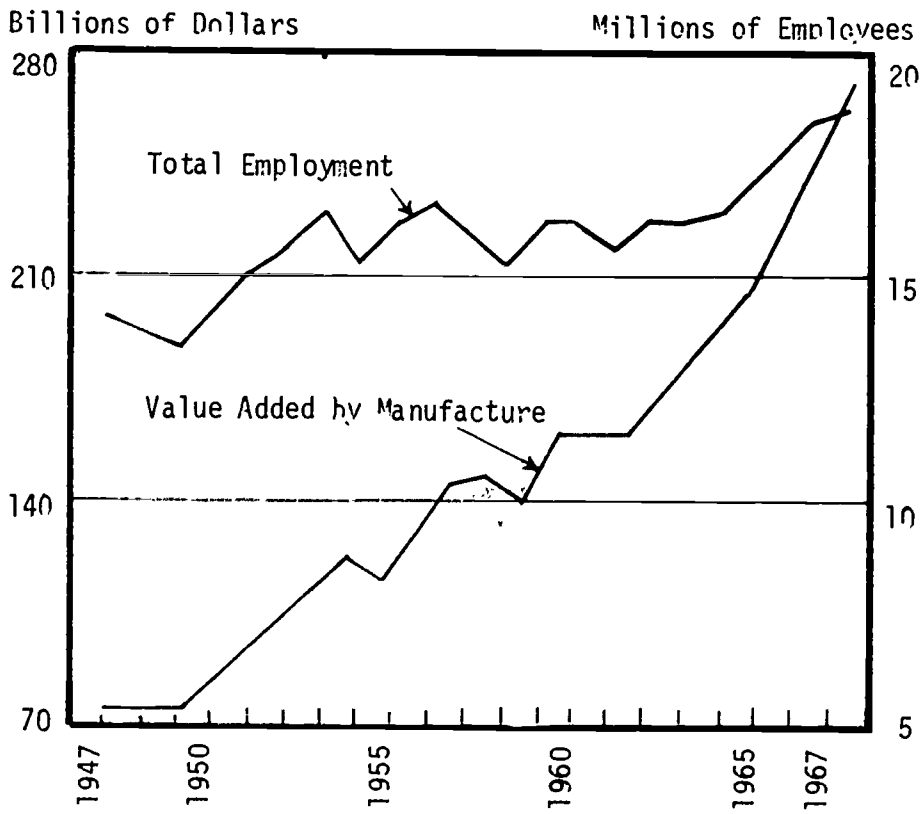
[1]Warner Bloomberg, Jr., The Age of Automation: Its Effects on Human Welfare (New York: League for Industrial Democracy, Inc., 1955), p. 4-5.

[2]U.S., Bureau of the Census, 1974 The American Almanac, p. 548.

Figure 13

United States - Value Added by Manufacture
and Total Employment, 1947 to 1967



Source

U.S., Bureau of the Census, Census of Manufactures, 1967, Vol. I, Summary and Subject Statistics (Washington: Government Printing Office, 1971), p. 24.

which helps to visualize the extent of our dependency on oil, is that 97,547,000,000 gallons of fuel were used by motor vehicles in 1971.[1] A further impact of the car industry is seen in the manufacture of parts. In many cases factories have been established exclusively for the manufacture of parts for the automobile industry. These factories offer employment opportunities to workers.

Transportation provides some interesting developments from which to consider the relative positions of railroads, motor vehicles, water-ways and oil pipelines. The graph, Figure 14 shows that dependency on the railroads has decreased steadily since 1945; that motor vehicles have shown an increase; water-ways have remained relatively steady, while the use of oil pipelines has increased. On this particular graph airways were not shown as a separate unit because they represented less than one per cent of the ton miles of domestic intercity freight traffic. The value of airways should not be under-estimated simply because of the statement regarding their relative position as a transport industry. When it is considered that it is only approximately forty years since the aeroplane became an accepted method of transportation, it has had a significant growth. As with car manufacture, aircraft construction requires a large support industry to provide the ready-manufactured parts to go into the final assembly. This has become important because of the numbers of people employed.

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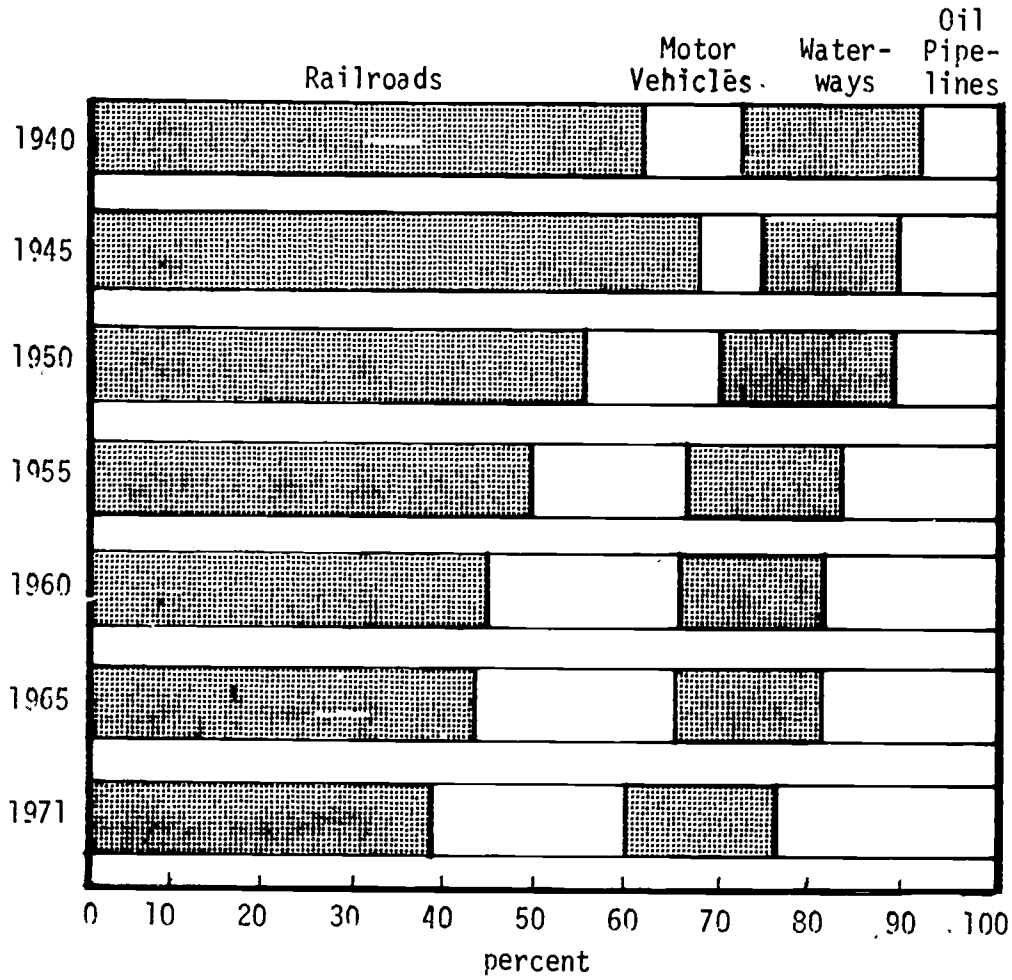
[1] U.S., Bureau of the Census, 1974 The American Almanac, p. 548.

Figure 14

United States - Type of Transportation, 1940 to 1971 - Percent Distribution of Ton-Miles



Source

U.S., Bureau of the Census, 1974 The American Almanac, p. 537.

A program which has added significantly to technological development in a number of related fields is the space program. Its growth can be seen in the allocation of money to N.A.S.A., the Department of Defense, and the Atomic Energy Commission. In 1960, $888 million were allocated to these three agencies. This spending reached a peak of $7,689 million in 1966, and in 1972 the figure was $4,772 million.[1] To many people this program seemed to be a gigantic waste of money, but in terms of the exploration and the development of technology, a veritable mountain of information has become available for industry, and in turn to the users of much household equipment. This is a good example of research being proved by practice and the technology then being applied to consumer related fields.

Electricity made its appearance in the late 19th century and with the growth of population and the expansion of industry and manufacturing, the demand for electricity has risen enormously. From the technology of our times has developed the nuclear power stations. While these, at the present time are very much experimental and in most cases still more expensive to operate than coal fired power stations, they are a reminder that technology is constantly being developed. They also provide the example that not all the by-products of technology are necessarily useful or beneficial. In this case the disposal of atomic waste is posing problems of great

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[1]U.S., Bureau of the Census, 1974 The American Almanac, p. 533.

concern and it even appears possible that the development of further power stations of this type may be restricted until improved knowledge provides better means of generation with less waste, or safer methods of disposal. These problems are not confined to atomic power stations. Almost all avenues of industry today are finding that more and more pressure is being applied to "clean-up" their processes. Recent discoveries indicate that industrial wastes are contaminating water supplies, that fall-out from lead smelters is causing lead poisoning, not only to workers in the industry, but also to people living in the near vicinity. The combination of smoke and fog is creating "smog", and this combined with car exhaust fumes is producing atmospheric conditions which are dangerous to human health.

This period is one in which social awareness is producing marked effects on the activities of industry and is also a time in which the average citizen is having a voice in the affairs which affect the quality of his life. Moral questions regarding responsibilities, rights, cost of anti-pollution measures, and who should pay for effective control of pollution have to be resolved.

An Educational Response - Industrial Arts Today

Writing in the Industrial & Vocational Education Magazine, Dr. Ivan Hostetler posed the question:

> What is industrial arts like today - 1964? Teachers and supervisors were asked this question but no one would give a specific answer. Most were of the opinion that basically it has not changed much in the past fifty years. On the surface, yes, the changes have been remarkable.

> But these have been largely in physical facilities and teaching materials. The new, well-equipped shops in campus-type buildings found throughout the country are the pride of the local communities and of the profession.[1]

This quotation points to the fact that even at this time industrial arts teachers in general have no clear idea on what constitutes industrial arts, its aims and purposes. There are at present a number of "innovative programs" which have been developed in an attempt to make industrial arts more meaningful and a greater force in education. None of these programs has gained nation-wide acceptance throughout the public school system. In the Office of Education publication, Industrial Arts Education, it is stated that 73.9% of the public secondary schools in the United States have industrial arts programs.[2] This suggests that the concept of industrial arts is considered to be a desirable feature of public school education.

While industrial arts has found general acceptance in the educational structure of the public schools there are divisions of opinion relating to methods of teaching in the "shop" and even the types of shops vary between school districts. The general shop which found its position in industrial arts in the 1920's is still in

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[1]Ivan Hostetler, "Manual Arts, 1914 - Industrial Arts, 1964," Industrial & Vocational Education Magazine, 50th Anniversary Issue, 53:18-24, May, 1964.

[2]U.S., Department of Health, Education, and Welfare, Office of Education, OE 33038 - Circular No. 791. Industrial Arts Education: A Survey of Programs, Teachers, Students and Curriculum, [by Marshall L. Schmitt and Albert L. Pelley] (Washington: Government Printing Office, 1966), p. 5.

evidence today. Unit shops which helped to form a basis of manual training can be still found in the school situation. Courses such as Woodwork I, or Metals I, etc. are still available. The open shop is being adapted for use in some school systems. This requires a large room where several different shops can be set up without divisions between them, pupils generally being free to work in that section most suited to their particular project. In addition, resource centers are generally developed so that the student can work as independently as possible of the teacher.

Howard F. Nelson[1] writing in School Shop reviewed his impressions of the path of industrial arts over the fifteen years prior to 1968:

> My memory serves me very well as I recall how teacher education became completely inebriated with the strong drink of the math-science-industrial arts kick. What happened at the time? In order to accommodate our convictions that industrial arts should be one vehicle for learning more science and math content, we eroded many of its unique features and substituted artificial exercises in our pursuit of this goal.
>
> Then we sobered up briefly only to imbibe again of the heady intoxicant of creativity. While under its influence our major concern was to channel all industrial arts experiences in such a way as to enhance creative outcomes.
>
> Following our adventure into creativity came the present ivory tower curriculum project development campaign. Right now we have perhaps as many as a dozen. Each which I have read could become an excellent social studies supplement, but in no sense a substitute for the kind of industrial arts which is needed today.[2]

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[1]Chairman of the Department of Industrial Education, University of Minnesota, Minneapolis.

[2]Howard F. Nelson, "Industrial Arts Malnutrition . . . and a Prescription," School Shop, 28:45, September, 1968.

This meandering on the part of industrial arts points to its lack of direction. There is no universally accepted set of aims. The wide variety of programs can, in itself, be a healthy feature of an educational system provided pupils can work constructively towards a common goal. That there is doubt about a common purpose in current industrial arts programs is supported by Donald Lux in the following quotation:

> There is a concensus of opinion that the schools as a whole are sick! It logically follows that industrial arts also is ill! Unfortunately, there is general disagreement upon the cause of the illness as well as upon the cure, either for the schools in general or industrial arts in particular, but any real concern for industrial arts must be sensitive to the trauma in the total education system as well as to that in industrial arts, which by nature is, or at least should be, a vital organ in that system.

He further states:

> The basic cure of the problems in industrial education lies in our unified pursuits of our own goals, not in charging off in all directions to tend whatever fires are burning brightly at the moment. We must be cognizant of the full range of educational needs and provide responsive programs as they relate to industrial technology, but we should not dissipate our total thrust by leaping from concerns for math and science to those for occupations, consumerism, space technology, careers, aesthetics, recreational abilities, et al., without regard to a comprehensive and concerted move to advance industrial arts as a whole.

Donald Lux concludes his article with these thoughts:

> In conclusion, industrial arts is no better or no worse than the rest of the common school subjects. There is much in its present status of which to be proud. But the future will not see the amelioration of the major problems which haunt us unless that pride is tempered by the realization of our inadequacies. We can perceive the difference between what we are and what we can be and we must! Our future, if we are to have one, must include

> proof that our profession can be responsive to the changing education needs of our technological society.[1]

In his doctoral dissertation, "A Study of the Various Aspects of Industrial Arts . . ." Levan Hill states:

> The study also reveals that industrial arts is continuously submitting its total program to critical examination and analysis.
>
> . . . . . .
>
> All facets of the society, educational philosophy and practice, and the nature of the learner and how he learns are contributing to this analysis.[2]

John Feirer, writing in an editorial in the Industrial Arts & Vocational Education makes the point that young people today apply the test of relevancy to all aspects of society and it is in education where they find it difficult to discover a relationship, so much so that "they rebel at what goes on in our schools."[3] He makes the claim that there is a gap between the philosophy and the theory of the new industrial arts and the way it is implemented. He suggests that there are not many teachers and even a lesser number of teacher educators who have been able to build a bridge across this gap.

> . . ., industrial arts is constantly under a cloud of criticism because most programs seem to be out of tune with

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[1]Donald G. Lux, "The Status and Future of Industrial Arts," Industrial Arts in a Changing Society, ed. Colleen P. Stamm, U.S., Educational Resource Information Center, ERIC Document ED 070 828, April, 1973.

[2]Levan J. Hill, "A Study of the Various Aspects of Industrial Arts as Influenced by the Changing Conditions of our American Civilization from 1880-1950," (unpublished Doctoral dissertation, The Pennsylvania State College, 1953), p. 267.

[3]Feirer, p. 29.

> today's living. It does not take a parent or an administrator who has visited many industrial arts programs in most technical high schools long to conclude that perhaps its greatest value is to keep the student busy and out of mischief, and it is a good place for students who aren't too successful with academic subjects, such as science or English.[1]

The innovative industrial arts programs now operating tend to gravitate towards a study of industry or a study of technology. Delmar Olson in an article published in School Shop, entitled "Industry versus Technology" has this to say on the subject:

> The issue of technology versus industry is easily resolved when we are willing to think of industrial arts as reaching its muscular and robust potential in the American school within the concept of industrial arts and technology. A study of industry becomes an integral part of the study of technology - . . . .[2]

In drawing his conclusions to the study of innovative programs in industrial education, Leslie Cochran brings out four main points. The first of these illustrates the situation existing in industrial arts:

> The field of industrial education has been in a constant state of flux and re-orientation since its early inception in the secondary schools. In the period since 1960, however, more modifications with wider implications have been produced than in any of the preceding decades during the twentieth century.[3]

The implication of Cochran's conclusion is that the field of industrial arts today is an even greater pot-pourri of ideas than it

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[1]Feirer, p. 29.

[2]Delmar Walter Olson, "Industry versus Technology," School Shop, 29:89, September, 1969.

[3]Leslie H. Cochran, "A Comparison of Selected Contemporary Programs in Industrial Education," (Doctoral dissertation, Wayne State University, Detroit, Michigan, 1968), p. 213 (Microfilm-xerography, University Microfilms, A Xerox Company, Michigan).

was in the 1920's. Attempts to establish a subject content which eventually will gain wide acceptance throughout the nation would seem to be frustrated until agreement is reached on the aims of industrial arts. Until such time as these aims are established and agreed upon there is little likelihood of unified goals within this field.

Some of the educational contributions industrial arts can offer to today's youth were identified in an Office of Education Circular, which was a report of the industrial arts program in the public school system in the United States during the years 1962 and 1963 and are listed as follows:

> An activity approach to learning.
> An opportunity for individualized student progression.
> An opportunity to interrelate with other disciplines.
> An opportunity for helping students make career choices.
> An understanding of consumer products.
> A study of fundamental tools, materials, and industrial processes.
> An understanding of industry and technology.[1]

In the final point made in Chapter 5 under "Summary and Implications," Schmitt and Pelley have this to say regarding industrial arts:

> Although this study is a status report on industrial arts education in the public secondary schools in the United States, one major fact stands out: The current industrial arts curriculum does not even measure up to the program recommended by the profession ten to twenty years ago.

They conclude this section by stating:

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[1]U.S., Department of Health, Education and Welfare, Office of Education, Industrial Arts Education, p. 30.

> Massive efforts need to be taken before the new industrial arts curriculum or any other new approach to teaching the industrial arts can make much of an impact on the current program and eventually improve the technological literacy of the American public.[1]

Summary

Social and industrial conditions today are reflective of changes constantly occurring about us. The changing modes of transportation of goods and people are features of our daily life. The productivity drive of industry is constantly introducing improvements in production techniques. The automobile has advanced from luxury to near necessity; so much of our life has come to depend upon its use.

There are few fields of endeavor which have not been affected by change. Technology is being developed at what seems an ever increasing rate. It is being applied to the domestic situation to produce a bewildering array of products for use in our everyday life. Industry too, utilizes this developing technology and it would seem that in order to clearly understand one, necessitates an understanding of the other.

In industrial arts education there has grown a movement seeking new directions. The need for this is apparent and has found expression in much of the writings relating to industrial arts. This need for change within industrial arts is also indicated by the number of innovative programs that have been introduced. The changing nature of society and industry supports this need if relevance is to

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[1]U.S., Department of Health, Education and Welfare, Office of Education, Industrial Arts Education, p. 30.

be a factor in selection. Those associated with the innovative movement tend to accept either technology or industry as their basis for content. For industrial arts to become unified in its aims it is necessary to establish clear objectives relevant to the societal and industrial conditions existing today.

Chapter 3

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

In arriving at a conclusion to this study, a summary of each of the countries will be considered, and in accordance with findings, final conclusions will be drawn.

The countries will be treated in order of their presentation within the thesis.

Russia. In Russia, the social conditions of an increasing population were altered by the emancipation of 1861. Large numbers of possessional serfs who were freed were placed in an untenable position as the plots of land they received were insufficient to provide them with an adequate means of supporting themselves and many were forced to look for other forms of employment. These freed peasants formed the basis of the working force which was required for industrial development. They lacked training for their new roles and the system in operation at that time of learning by observation, whenever possible, was inefficient and could not contribute to a better standard of skilled worker.

Victor Della Vos saw this need for a more efficient method of teaching, and developed at the Imperial Technical School at Moscow, a system of manual education which comprised a series of exercises

aimed directly at developing skills. By having one teacher supervise a group of students, the efficiency, in terms of numbers trained, was greatly improved and helped to answer the need for more skilled workers.

Sweden. Conditions in Sweden were changing; population was increasing; machine manufactures were producing lower cost items and these became popular because of the price and the novelty of manufacture. This popularity of machine made goods led to a decline in Home Sloyd. At the same time a liquor problem which had plagued Sweden over an extended period of time became prominent again. The introduction of Sloyd was more an attempt to revitalize a society than to produce trained or skilled workers. Industrialization in Sweden at the time revolved around the mechanization of the timber industry and the quest for improved production of high quality iron.

Otto Salomon applied philosophic and pedagogic principles to Sloyd to develop what has become known as Educational Sloyd. It was intended that the child would develop physical skills and, would at the same time, gain an appreciation of aesthetics and a regard for the dignity of labor.

England. During the 19th century, England with its increasing population passed through times of severe stress due to the impact of the development of industry. The Arts and Crafts Movement was a protest against the dehumanizing of the worker and his subjection to the demands of a machine. It sought to give the worker joy in making, complete personal involvement in his work, and satisfaction

in his labors. The Movement protested against the attendant social ills evident in industry and urbanization. Emphasis was laid on the aesthetic quality of the article. The Arts and Crafts Movement did not manifest itself directly in the public school system, but rather public expression was found through the Arts and Crafts Exhibition Society and eventually there was established, in 1886, the Central School of Arts and Crafts, London, a school for workers involved in the crafts. Arts and Crafts became incorporated in other systems and its influence was an emphasis on involvement and design.

America. America in the period 1850-1920 was undergoing tremendous growth of population, cities were developing rapidly and agriculture was expanding - initially through the Westward movement and later because of increased mechanization. A constant drive for greater productivity per man hour invariably demanded the use of increasingly sophisticated machinery. The movement of the population was from agriculture to industry. The decay of the apprenticeship system necessitated the development of another system of industrial training. The introduction of manual training, although based on grounds of general education, was supported by industrialists who hoped to get in return a better industrial worker.

Early in the 20th century dissatisfaction with manual training became apparent. Some educators believed that it was no longer relevant to the type of industrial society which had emerged. Industry had become more complex; greater mechanization had taken place; mass production had been introduced into the

automobile industry, and improved industrial techniques had evolved. It was into this situation that industrial arts first appeared, aimed at helping students understand industrial processes and materials.

There is strong evidence to support the contention that the present is a period of change; change which has affected modes of transportation, use of household appliances and methods of communication. Industrial arts is still making use of the general shop today as it did in the 1920's. There has been some movement towards the introduction of "innovative" programs which tend to have their basis in industry or technology. While these programs have been established they are not in widespread use and although they represent efforts to effect changes, there has been no common agreement on what constitutes the aims and objectives of industrial arts.

Conclusions

In the countries studied, the various forms of manual education that emerged did so in response to a need that developed through either societal and/or industrial conditions pertaining to that era.

The objectives of each form of manual education that developed in the various countries differed in accordance with the needs of that particular country. Manual education has been required to fulfill a variety of roles depending upon the needs.

Not all manual education responses have become evident through the public school system.

In the light of data collected, which showed that:

(a) manual education developed in response to changes in societal and/or industrial conditions,

(b) societal and industrial conditions have changed markedly since the introduction of industrial arts into the public school system,

(c) similar marked changes cannot, in general, be found in industrial arts since 1920,

a need for change in industrial arts exists so that it is compatible with current societal and industrial conditions.

Recommendations

A committee of a recognized professional body, such as the American Industrial Arts Association or the National Education Association, should seek to establish common acceptable aims and objectives for industrial arts. These aims and objectives should be stated in general terms so that a variety of approaches to these common goals can be adopted.

A "watch-dog" type committee from either a professional association or the U.S. Office of Education should be empowered to regularly survey the form of manual education currently established to ensure that its aims remain consonant with developments within society and industry.

All industrial arts teacher trainees should undertake a History of Industrial Education course to enable them to gain an understanding of factors that influenced industrial arts development in the past and the impact of these factors on the subject today.

In the event of one or more of the innovative industrial arts programs proving to be a desirable direction for industrial arts,

Federal Government money should be made available to defray the costs of converting or developing facilities and for the provision of such equipment as is required to implement the scheme. At the same time there should be federal financial support for an in-service teacher training program to enable all teachers to become familiar with the aims and objectives of the selected program or programs.

Recommendations for Further Study

Arising from the study undertaken, and in drawing conclusions and recommendations, the following areas for further study became evident:

1. A study should be undertaken to determine, in the light of present societal and industrial conditions, what needs exist in society that some form of manual education might best fulfill, either within or without the public school system.

2. When the needs for some form of manual education have been identified the most appropriate form of manual education to fulfill these needs should also be investigated.

3. In the light of the needs established and the form(s) of manual education identified as being most appropriate to those needs, there should be a study conducted to determine the aims and objectives so that the chosen form(s) of manual education might best fulfill its role.

4. An in-depth study of industrial arts should be undertaken to determine the changes that have occurred since its inception in the 1920's, and whether or not these changes are in harmony with changes that have occurred in society and industry.

5. While this study undertook a review of societal and industrial conditions and identified an educational response, there exists a need for a review of the relationship of psychological and philosophical principles to each of the various forms of manual education.

6. An investigation of each of the current innovative industrial arts programs should be undertaken to determine whether any or all of them represent desirable forms of manual education applicable within today's societal and industrial conditions.

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APPENDIX A

Extract from an Article by Gustaf Larsson dealing with Augustus Abrahamson and his contribution to the School of Sloyd at Naas

Just a word about the founder of this valuable institution at Naas, and the provisions made for its future maintenance. August Abrahamson, who died at his estate in Naas, May 6th, 1898, provided in his will that the educational establishment founded by him should be kept up for all future time at Naas, under the name of the August Abrahamson Stiftelse (Foundation), its aim being the continued training of teachers who have already devoted themselves to work for education in general, and especially for the continuance in that institution of pedagogic sloyd. It is also directed that this educational work, as far as its funds will permit, shall always be carried on "in accordance with the progressive demands of the times." The Foundation, endowed with the Naas estate, together with the personal estate, amounting to something over $100,000, is given to the State. The total value of the Foundation may be estimated at about $200,000. The will further directs that Otto Salomon, the testator's nephew, who has directed the institution ever since its establishment, shall continue his directorship, either personally or by deputy, and be the sole administrator of the Foundation, with unlimited power and authority to direct everything connected with the educational work. Finally, it is the will of the deceased that teachers from foreign lands shall be allowed to enjoy the privileges of the school.[1]

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[1]Gustaf Larsson, "Otto Salomon - 1849-1907," Manual Training Magazine, 10:105, December, 1908.

APPENDIX B

Comparative Table of Different Kinds of Sloyd

Branches of Sloyd	Does it accord with children's capability?	Does it excite and sustain interest?	Are the objects made useful?	Does it give a respect for rough work?	Does it train in order and exactness?	Does it allow of cleanliness and neatness?	Does it cultivate sense of form?	Is it beneficial from hygienic point of view?	Does it allow of methodical arrangement?	Does it teach dexterity of hand?
Simple Metal Work	Yes & No	Yes	Yes	Yes	Yes & No	Tolerably No	Yes	Yes?	Yes	Yes
Smith's Work	No	Hardly	Tolerably	Yes	No	No	No?	Yes & No	Perhaps	No
Basket Making	No	Hardly	Tolerably	Yes	No	Yes?	No	No	No	No
Straw Plaiting	Yes	Yes?	Yes	Yes & No	Yes	No & Yes	No?	No	Yes	No
Brush Making	No?	Yes?	Yes	Yes?	Tolerably	Yes	No	No	No	No
House Painting	No	No	Yes & No	Yes	No	No	No	No	No	No
Fretwork	Yes?	No & Yes	No & Yes	No	Yes	Yes	No & Yes	No	No & Yes	No
Book-binding	No	No & Yes	Yes Tolerably	Hardly	Tolerably	Yes?	No	No?	Perhaps	Tolerably

Comparative Table of Different Kinds of Sloyd - Cont'd.

Branches of Sloyd	Does it accord with children's capability?	Does it excite and sustain interest?	Are the objects made useful?	Does it give a respect for rough work?	Does it train in order and exactness?	Does it allow of cleanliness and neatness?	Does it cultivate sense of form?	Is it beneficial from hygienic point of view?	Does it allow of methodical arrangement?	Does it teach dexterity of hand?
Cardboard Work	Yes & No	Yes?	Yes	No	Yes Very high	Yes	Yes?	No	Yes	No?
Sloyd Carpentry	Yes	Yes	Yes	Yes?	Yes	Yes	Yes	Yes?	Yes	Yes
Turnery	No	Yes	Yes?	Hardly	Partly (not quite.No)	Yes?	Yes	No	No	No
Carving in Wood	Yes?	Yes & No	Yes & No	No	Yes	Yes	Yes & No	No	Yes	No
Not Regarded as a Kind of Sloyd, but Useful for Comparison										
Clay Modelling	Yes	Yes	No	No	Yes & No	No	Yes	No	Yes	No

Source: Salomon, p. 118.