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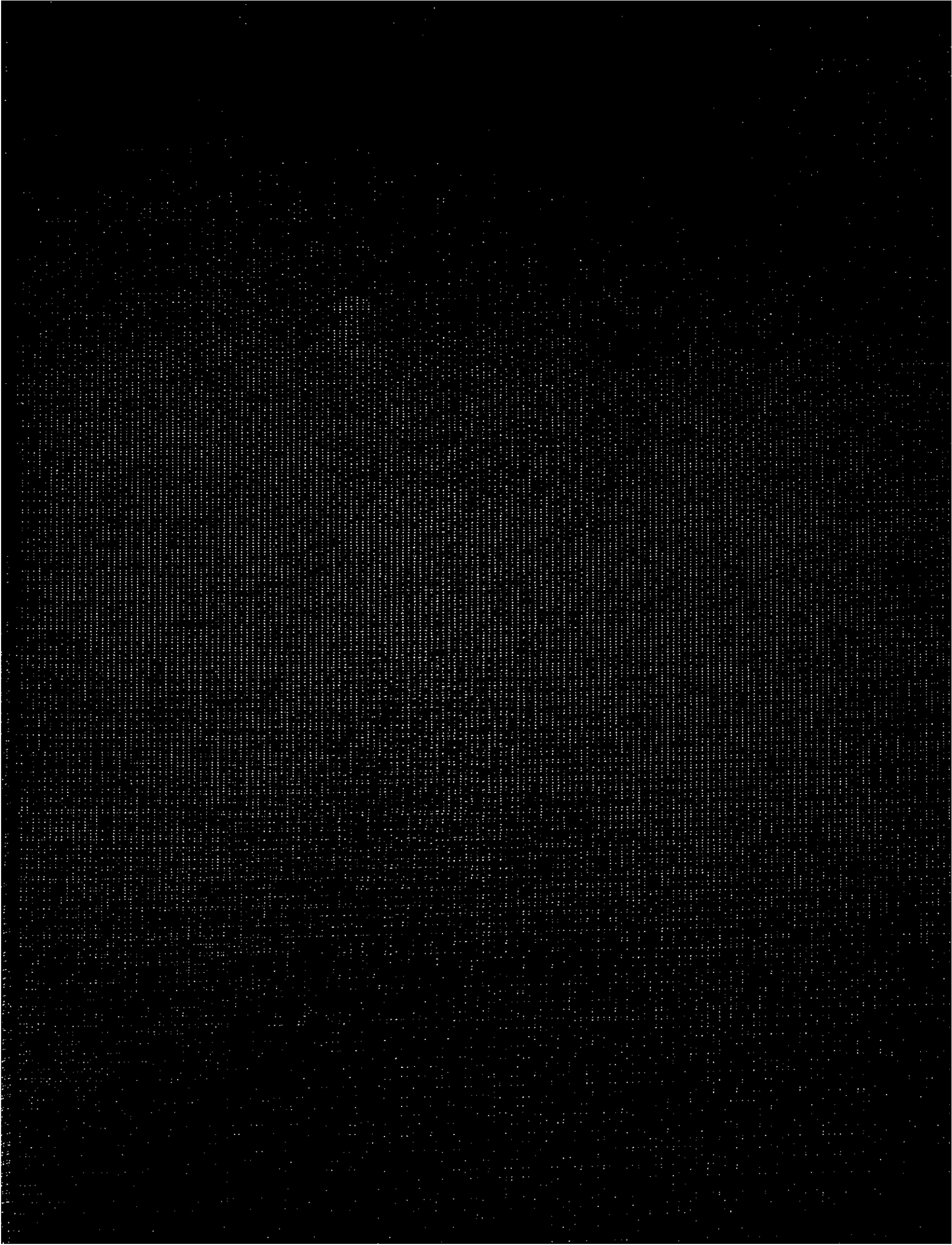
# Industrial and Vocational Education in Massachusetts

Chimaki Kageyama



# Industrial and Vocational Education in Massachusetts

by

Chimaki Kageyama

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# INDUSTRIAL AND VOCATIONAL EDUCATION IN MASSACHUSETTS.

By Chimaki Kageyama

## Part I

### Outline of Vocational Education in Massachusetts.

In the current discussions of vocational and industrial education many terms are loosely used. A more complete definition of such terms seems necessary before entering any further into the problem.

"Vocational education": In the ordinary usage of the term vocational education includes all the various forms of higher or professional education. For example, education for the law, medicine, and for the various phases of engineering are forms of vocational education; also agricultural education; commercial education; training of teachers and allied subjects all present phases of vocational education.(39)

Mr. Prosser, former Deputy Commissioner of Education in Massachusetts, defines vocational education as education that has for its controlling purpose the fitting of persons of either sex for definite callings or pursuits. He says,"When vocational education fits for law, medicine, theology, teaching, engineering, we call it professional education; when vocational education

fits for service in business, we call it commercial education; when vocational education fits for the trades, crafts and manufacturing pursuits, including the occupations of girls and women carried on in the workshops, we call it industrial education. In this sense, schools bestowing vocational education of any type, whether it be professional, commercial, agricultural, industrial, household or marine, may be termed vocational schools."(45)

But in its narrow sense, when applied to industrial education a vocational school, according to the Committee on Industrial Education of the American Federation of Labor, is one which "prepares for a manual occupation which is not classed as a trade, or gives training in some line of manual work for the purpose of directing the pupil toward, rather than in immediate preparation for a trade or other manual occupation." (60.1912.p.114.)

"Industrial education: In large sense the term may include all education relating to the industries, and in this sense would include instruction in industrial arts in the elementary school, trade and technical instruction designed for the industrial workers and the professional education of engineering schools. But in its narrow and common usage, the term is used to denote "the field of elemental or intermediate vocational educ-

ation aimed to meet the needs of the manual worker in the trades and industries where the manual element is more prominent, and the intellectual or scientific is of a more elementary character."(49)

A Committee on Industrial Education of the American Federation of Labor (60) defines industrial education as "the field of education designed to meet the needs of the manual worker in the trades and industries,including the work of schools that aim to prepare pupils for entrance into the manual voaction, either as learners, apprentices or journeymen, or to give supplemental instruction to those already in a trade or other manual vocation."

"Industrial school": According to a Committee of the National Society for the Promotion of Industrial Education,(22) industrial or trade school is an educational agency established to secure the following ends:

"a. Primarily to increase through proper training of the worker, either before or after entrance, his efficiency in some one trade or occupation.

"b. To train better citizenship.

"c. To extend the general intelligence of the pupil."

In Massachusetts the State-aided Vocational Schools

are authorized to fit persons for the occupations connected with agriculture, industries, and the household but this paper confines itself rather to a consideration of industrial education which is defined as "form of vocational education which fits for the trades, crafts, and manufacturing pursuits, including the occupations of girls and women, carried on in workshops."(63)

During the past few years the interest in industrial or vocational education has steadily increased among all classes and in all directions throughout the country. Both employers and employed are meeting on the common ground of mutual interest. Social workers are claiming that it is one of the most serious problems of life--that of making a living.(62) Educators are more thoroughly awaking to the fact that the industrial education is to be one of the next great advances in the educational movement.

In this concern, Massachusetts was the first state to pass laws committing the State to engage actively in the establishment of industrial schools. To bring into its present situation of achievement, the State has had a more varied history in the administration and control of this form of education than any other states. At present it exceeds all otherstates in

the number and the variety of types in industrial schools with the possible exception of New York. It may be safe to say that Massachusetts is the most advanced state in the United States in employing the most progressive policy and also in many other respects of this movement.

In general, formerly the tendency of public school education gave but incidental consideration to vocational needs. The elementary school, the general secondary school and the liberal arts college have not been designed to supply vocational demands. Long ago, however, vocational schools were established for certain callings which were difficult of acquisition or of special social value, namely, medicine, theology, law, pharmacy, war, engineering, teaching and so forth. These schools developed when the apprenticeship system for these vocations proved insufficient. Modern industrial conditions have brought about a general decline in the efficiency of the former type of vocational education. But in many lines of industrail and commercial work, training on the old basis of imitation and apprenticeship is found to be impracticable and insufficient. The current educational thought has begun to recognize the responsibility of the public school system for other forms of education than those commonly called liberal. On one hand there is a

demand for something besides merely cultural education, and on the other the need of something to take the place of the old apprenticeship system is felt. Thus a much wider expansion of vocational education in the schools has become a necessity.

Massachusetts early took steps to supplement its systems of schools designed for liberal education by the introduction of schools specializing in one or more phases of vocational training. Forms of vocational education in this were first provided for those qualified for leadership. Professional schools, some privately supported and some aided by the State, including admirable institutions for technological training, such as Massachusetts Institute of Technology (1865) and the Polytechnic School of Worcester (a few years later), have been in existence for many years.

Technical schools for the textile industries, such as textile schools at Lowell, New Bedford, and Fall River, are maintained with a special view, on the one hand, of preparing the master workers in these industries, and, on the other, for reinforcing in evening classes the practical work of day workers. The State Agricultural College has gradually raised its standards and become in effect a professional school. In another domain, the

State also early developed vocational training. In its institutions where the physically defective and the morally delinquent are gathered a large amount of vocational training is given, in accordance with a policy initiated more than half a century ago.

Private enterprise long since developed a system of vocational schools for certain commercial callings. Many local high schools also have established vocational departments in these fields,--such as bookkeeping, typewriting, stenography and other business subjects. It may safely be said that much has been accomplished that is of value, although there is not a definite vocational purpose in this work.

A brief history of Legislation and the work of the Commission.

In Massachusetts the establishment of industrial schools by cities and towns was first authorized by the Legislation in 1872, (Acts of 1872, ch.86) and many experiments therein have since been tried in some cities. It is said that this early law of 1872 was the most comprehensive and at the same time the simplest law for the encouragement of industrial schools that any state has passed. It read as follows:

"A town may establish and maintain one or more in-

dustrial schools, and the school committee shall employ the teachers, prescribe the arts, trades and occupations to be taught therein and have the general control and management thereof; but it shall not expend for any such school an amount exceeding the appropriation specifically made therefore, nor compel a pupil to study any trade, art or occupation without the consent of his parent or guardian. Attendance upon such school shall not take the place of the attendance upon public schools required by law."

This law is said to be in its original form a compulsory law. But during the discussion in the legislature shall was changed to may and the bill emerged a voluntary measure.(20)

In 1870, in response to a petition of some of the leading manufactures of the state, drawing was made a required study in all public schools, and instruction in instruction in industrial or mechanical drawing for persons over fifteen years of age was made compulsory upon all municipalities having 10,000 or more inhabitants.

Concerning the manual training, the earliest advocates urged strongly to propose the work whether in the elementary or in the high school, because of its vocational significance. The report of a public school board

in 1878 says: "The question of teaching trades in our schools is one of vital importance. If New England would maintain her place as the great industrial centerof 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, 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."

In 1882 the classes in wood-working were organized in the North Bennett Street Industrial School, supported by the generosity of Mrs. Quincy A.Shaw. Soon after a Manual Training Committee was appointed by the school board in January 1884. For several years its functions were (1)"to have general charge of various forms of experimental work,.....;(2) to emphasize the educational value of manual training and arouse interest in it." The orders which made manual training a part of the public school system and caused the city to assume financial responsibility for it were passed in 1887.

According to Mr. Leavitt, who reports as follows: "By 1893 manual training had been introduced into the high school curricula, instruction being given either in separate schools or in the existing schools, in many cities such as Cambridge, Fall River, Springfield and Boston.

.....Not only was manual training established in the high schools, but efforts were made early to secure its introduction into the elementary schools. One of the most far-reaching influences of the Swedish sloyd system is to be be found in the insistence of its early advocates that hand work was an essential in the education of young children."(36)

Later, for the purpose of promotion of industries, cities having twenty thousand or more inhabitants made manual training compulsory by law in the high school,-in 1894,(Acts of 1894, ch.471), and in elementaryschools in 1898,(Acts of 1898, ch.496). But very little time was allotted to this subject, and its aim became cultural rather than vocational. In 1906, the state commission, after careful study of the subject of industrial education, reached the conclusion that "manual training as administered in the school did not meet the needs of distinctly industrial or vocational education."(9)

In 1902, revised laws were passed,(Section 2,Chapter 42, Revised Laws of 1902), and this law authorized towns to maintain evening schools; course of study including industrial drawing, both free-hand and mechanical. The maintenance was mandatory for cities and towns of ten thousand or more population. In 1904, these revised laws were amended; and Chapter 248, Acts of 1904, authorized

the organization of corporations for the conduct of textile schools, and provided for instruction in the theory and practical art of textile and kindred branches of the industry. The schools were to be supported by appropriations from the city and the state.(23)

In June 1905, the first Commission on Industrial and Technical Education was appointed for one year, and after careful investigation they made an important report in April, 1906, on the need of industrial education, and on the industrial condition in Massachusetts. The recommendation of that commission led to a statute requiring to appoint a commission on Industrial Education for a term of three years.

The members of the new commission were appointed in August 1906, and were organized in the next month.(36) This commission engaged actively in the endeavor to carry out the provisions of the statute under which it was appointed. The most important provisions of that statute are as follows:-

1. To continue the investigation into industrial conditions and industrial education begun by an earlier commission, and to provide for lectures on the importance of industrial education and kindred subjects.

2. To visit and report on all special schools in which industrial education is carried on.

3. To initiate and superintend the establishment and maintenance of independent industrial schools (i.e.schools independent of the existing public schools), including schools for instruction in the principles of agriculture and the domestic and mechanic arts, for boys and girls in various centers of the commonwealth,(with the co-operation and consent of the municipality involved or the municipalities constituent of any district to be formed by theunion of towns and cities;) such schools to be for children over fourteen years of age. The commission has all necessary powers in the conduct and maintenance of industrial schools, and money appropriated for their maintenance by a municipality and the State is expended under its direction. The schools are to be supported by money appropriated by the municipality and by the State, the State aiding in the maintenance of such schools in proportion to the expenditure locally for schools. Each payment to any city or town, however, requires a special appropriation by the Legislature.

4. To provide in the industrial school part-time classes for children between the ages of fourteen and eighteen, and evening classes for such persons and older persons already employed.

5. The commission is required, also, to report annually to the Legislature on the condition and progress of

industrial education during the year, stating what industrial schools may have been established, and the appropriations necessary for their maintenance; and, further, to make such recommendations as the commission may deem advisable.

6. Especially, the commission shall consider and report at an early day on the advisability of establishing one or more technical schools or industrial colleges, providing for an extended training in the working principles of the larger industries of the Commonwealth.

7. The commission must appoint a secretary, who is to be its executive officer.(23)

The work and general activities of the executive officers may be enumerated as follows:

1. Attendance upon the sessions of the commission.

2. The work of administration, including the organization and direction of the working force at the central office and in the outside investigations, and the outlining and supervision of the specific work undertaken.

3. The origination and putting into operation of methods and plans foraccomplishing the work of the commission.

4. The presentation of needs and plans to the commission, and the carrying out of these and other plans

proposed or sanctioned by the commission.

5. Holding of conference and meetings at the office of the commission.

6. Holding of conference and meetings in various localities.

7.The study of local conditions in the State by personal observation and inquiry, by letters of inquiry, and through reports of special agents.

8. The presentation, by conference, correspondence and addresses, and through the press, of information regarding the commission's work.

9. The personal study of the organization, operation and results of some of the important independent trade or industrial schools in the United States.

10. The study of industrial and trade school systems in Europe, through personal conferences with the leaders of the industrial education movement and by personal inspection of a number of the most important schools in eadh country.

11. The development of local interest in the establishment of industrial schools suited to local needs.

12. The securing of specific information regarding local demands for special schools.

13. The presentation of needs of whole and part-time courses in industrial schools.

14. The giving of addresses before public assemblies. (It is said that requests for such addresses have been numerous, both from within and without the State.)

15. The meeting of local committees and boards of directors, for the purpose of explaining to them the assistance that can be furnished by the State in carrying on industrial education, and also assisting them in making their decisions as to what industrial instruction is best fitted to their special needs. (It is said that such meetings have been held in these days.)

This was the chief work done by the commission. The commission also published many publications,(19), such as:

1. The reports of the commission. (This report is said to have done more to shape the thought and action throughout the country than any other volumes written on the subjects of industrial education.)
2. Industrial Continuation Schools for Jewelers' and Gold and Silver Workers' Apprentices.
3. Industrial Continuation Schools for Male Commercial Employers.
4. Industrial Continuation School for Machinists'Apprentices.
5. Industrial Continuation Schools for Mechanicians' Apprentices.
6. Industrial Continuation Schools for Bookbinders' Appren-

tices.

7. A brief mention of some typical European Schools visited by the representatives of the commission.

These works were mostly done by the commission during the years 1907 and 1909. It will be safe to say that the present development of industrial education in Massachusetts has laid its foundation during these years by the zealous work of the Commission.

In July, 1909, however, after these three years of careful study and trial, the plan of the independent Commission on Industrial Education was found to be unsatisfactory and a bill was passed by the Legislation,(Acts of 1909, ch.457), abolishing both the State Board of Education and the Commission on Industrial Education, and established a nww reorganized State Board of Education in its place, having all the rights, duties and responsibilities of both the Commission and the Board. Each of these organizations ceased to exist on the last day of June, 1909, while the necessity of continuing and carrying on the work remained. The new law also provided for an increase in the number and responsibilities of its administration staff, that is, a commissioner of education and two deputy commissioners, one of whom should be especially qualified to deal with the field of industrial education.

Since the reorganization of the state board, it has

accomplished very important work in standardizing the various types of schools that come under its control, in regard to scope, course of study and methods in instruction, as well as in furthering the establishment of a considerable number of schools.

At present, vocational education in Massachusetts is mainly operated under the authority of laws which provide for State assistance to cities and towns maintaining this work on condition that the Board of Education supervise such instruction. The purpose of the State in furnishing such training, at public expense is expressed in various acts by Legislation for vocational education, e.g. (1) the adult workman already engaged in a trade may perfect himself to a certain extent in his calling;(2) the boy or girl over fourteen years of age, soon to enter an industrial occupation, may secure preliminary training, and (3) the person who, at the close of the compulsory school period, becomes a wage-earner, often in an unskilled industry, may continue to receive instruction along lines best adapted to his needs.

In accordance with this Legislation, several types of schools have been organized, such as,(1) Evening Schools, early established in which trade extention courses were given for the benefit of experienced workmen in skilled industries; (2) Full-time day industrial schools, organized

to have the youth from fourteen to sixteen years of age given the advantage of training for his intended trade; (3) the Part-time or Continuation schools , intended to serve the large group of young people who leave school and enter some calling as soon as the law permits.

Progress.

The following is the brief account concerning numbers of schools, of industries taught, and of students, since the first appointment of the Commission on Industrial Education:

In the first year, 1907-1908, 6 schools gave, through day or evening classes, training in 4 occupations to about 1400 persons.

In the year 1908-1909, there were 5 day schools and 10 evening schools, offering more than 12 industries to 4738 students.

In the year 1910-1911, there were 21 schools instructing 5848 persons through day part-time and evening classes, fitting for more than 50 occupations within more than 15 distinct industries.

During the school year 1911-1912, there were 35 schools operating under the statute on state-aided vocational education, with 7164 students. In these day schools there were 13 departments in the lines of different industries. Also in the evening schools, 99 courses in 40 dif-

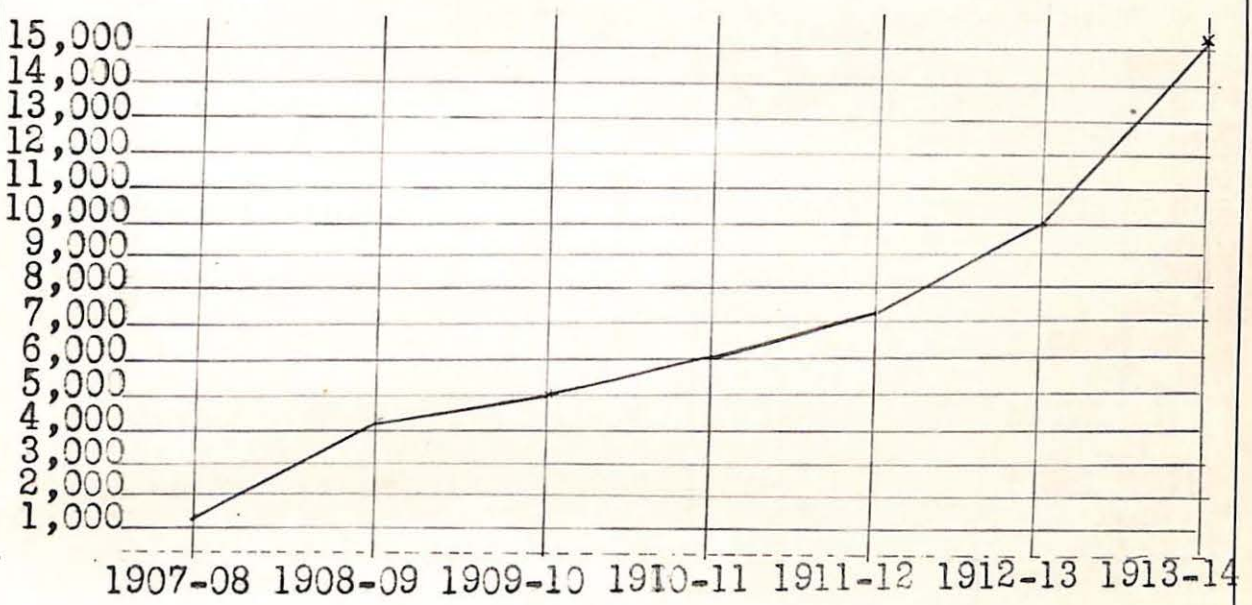
ferent subjects were given.

In the year 1912-1913, 40 State-aided vocational sc schools classified as administrative units without regard to number of activities, were in operation in 33 cities and towns in the State. (On this same basis of classification there were 28 schools in 24 cities and towns in the school year 1911-1912.) The total number of schools was 55, with 10,759 students, and 20 departments in day schools and 122 courses in 37 different subjects were given in evening schools.

The number of students attending certain public institutions not State-aided was 4498.

In the year 1913-1914, 47 State-aided vocational schools, classified as administrative units (with a separate director in charge), were in operation in 36 cities and towns of the State. The number of pupils attending State-aided vocational schools was 15,575. The number of students attending certain institutions not State-aided was 5,000.

The following table shows the number of students reached, by years, in day, part-time and evening schools. (State-aided Vocational Schools.)



The following table shows numbers of students, trades taught and courses given in State-aided vocational schools for 1912-13.

| | Full time day schools | Full time cooperative day schools | Part time cooperative day schools | Evening schools | Total |
|---|---|---|---|---|---|
| Number of schools | 25 | 3 | 2 | 25 | 55 |
| Number of teachers | 215 | 15 | 9 | 388 | 627 |
| Number of pupils:- | | | | | |
| Girls, | 1,331 | – | – | 4,572 | – |
| Boys, | 1,626 | 130 | 27 | 3,073 | – |
| Total number of pupils | 2,957 | – | – | 7,645 | 10759 |
| Number of trades taught | 20 | 12 | 9 | | 41 |
| Number of trade extension courses | – | – | – | 67 | 67 |
| Number of practical arts courses | – | – | – | 6 | 6 |

During the school year 1912-1913, in the day schools the following lines of industry were given:

Machine shop work.
Automobile work.
Sheet metal work.
Coppersmithing.
Steam engineering.
Electrical work.
Telephone construction and maintenance.
Power plant engineering.
Pattern making.
Cabinet making.
Joinery.
House carpentry.
Mold loft work.
Plumbing.
Printing.
Agriculture.
Dressmaking.
Millinery.
Power machine operating.
Cooking and serving.
Homemaking.

During the school year 1912-1913, 122 courses in 37 different subjects were given in evening schools, as follows:

Building trades: (27 courses in 7 different subjects.)
Drawing and plan reading; drawing for sheet metal workers; drawing for structural steel workers; interior decorating; plumbing; roof framing; stair building.

Electrical trades: (9 courses in 2 different subjects.)
Drawing for electricians; wiring, motor and power work.

Engineers, janitors and firemen: (4 courses in 3 different subjects.)

Boiler firing; gasoline engine practice; steam engineering.

Granite workers: (1 course in 1 subject.)

Monument design and lettering.

Jewelry workers: (3 courses in 2 different subjects.)

Design and modeling; engraving and coloring.

Machine trades: (44 courses in 9 different subjects.)

Automobile construction; automobile repairing; drawing; forging; shop mathematics; shop practice; tool making; tool design; gear design.

Paper makers: (1 course in 1 subject.)

Chemistry.

Printers: (2 courses in 1 subject.)

Composition.

Shipfitters: (1 course in 1 subject.)

Mold loft work.

Textile trades: (5 courses in 3 different subjects.)

Loom fixing; ring spinning fixing; weaving;design.

Woodworking trades: (7 courses in 2 different subjects)

Cabinet making; pattern making.

Women's trades: (7 courses in 4 different subjects.)

Cooking; dressmaking; millinery; power machine operating.

Household arts for women was given in 17 cities and towns.

## Part II.

### Classification.

As has been previously shown, there are various public and private schools besides the State-aided industrial schools in Massachusetts. Most of these are, it is said, the concrete expression of an economic and industrial necessity of the community, and are generally organized and maintained either by the respective trade guild or other industrial associations, or by the city or town in which they are located. Others were establi shed by philanthropy and private enterprise. From this viewpoint, it may be said that there are:

(a) such schools maintained at the public expense; (b) such schools maintained by endowment; (c) such schools maintained by tuition fees; and (d) such schools maintained partly by endowment and partly by tuition fees.

Of this type of school there are: (1) Full-time schools; (2) Co-operative schools; (3) Part-time schools; (4) Continuation schools; (5) Apprenticeship schools; and lastly (6) Trade Extension Courses and Practical Arts Courses in the evening schools.

According to the writer's convenience, the industrial schools of Massachusetts will be classified briefly as:

1. Independent Industrial Schools.
2. High Schools with industrial departments.

3. Technical or Mechanical Arts High Schools.

4. Pre-vocational Schools.

5. Private or Endowment Industrial Schools.

6. Employment Schools for Apprentices.

Classification chart.

I Public
- 1. Independent Industrial Schools.
  - (a) Day Schools
    - Full-time schools.
    - Co-operative schools
    - Part-time schools
    - Continuation schools
  - (b) Evening Schools
    - Trade extension courses.
    - Practical arts courses
- 2. High Schools with industrial departments.
  - (a) "School-shop" plan
  - (b) Co-operative plan
- 3. Technical or Mechanic Arts High Schools.
- 4. Prevocational Schools.

II Private
- 5. Private or Endowment Industrial Schools.
  - (a) Day Schools
    - Full-time instruction
    - Part-time instruction
  - (b) Evening Schools
- 6. Employers' Apprenticeship Schools

## Special Legislation for the Independent Industrial School.

The types of state-aided industrial schools are based on the needs of two principle classes of the wage-earning population, namely, those engaged in the skilled industries and those desirous of fitting themselves for such employment These state-aided industrial schools are operated under the authority of the law.

Legislation. The most important legislation relating to independent industrial schools, since the reorganization of the State Board of Education, is the Acts of 1911,ch. 471. The essential part of this law consists of ten sections and "sections one to six are inclusive of Acts of 1906, ch.505; sections one to four are inclusive of the Acts of 1908, ch.572 and of Acts of 1909, ch.540; and all acts and parts of acts inconsistent are repeated by this law."(1)According to this Acts of 1911, the legislation authorizes the establishment and maintenance of three types of such schools:

(1) All-day schools for children over fourteen years of age who are not engaged in any wage-earning occupation; (2) Part-time or continuation classes for children between fourteen and eighteen years who may be employed during the remainder of the day; and (3) Evening courses for persons already employed in trades.

The legislation creating these independent industrial schools provides for their joint support and control by the local community in which they are established, and by the State. Local communities may establish maintain such schools. When they have been approved by the State Board of Education these schools are entitled to reimbursement to the extent of one-half the money that has been expended for their maintenance. Approval by the Board of Education acting as its agent brings support from the Commonwealth to the school. Such support in turn brings from the local authority conformity to the standards in the location, equipment, courses of instruction, qualifications of teachers and methods of instruction set up by the Board of Education in its task of supervising and approving the work of the school.

In 1912, definite progress was made in the establishment of evening schools designed to furnish instruction in household arts to young women, seventeen years of age or older who are employed during the day. This is known as an Act to provide for the "Establishment and Maintainance of Evening classes in the Practical Arts for Women." It was approved in February, 1912. According to this law, all women who are any line of wage-earning occupation or are house-mothers, or house-daughters who take part in the home work, are eligible for instruction. It is considered

that this Act of 1912 removed certain restrictions imposed by former legislation which limited such courses to women engaged in occupations,--on a trade extension basis only--that is those "already employed duringthe working day", and "it must in its instruction deal with the subject-matter of the day employment, be so carried on as to relate to the day employment".(Acts of 1911, ch.471.) For example, a person over seventeen years of age engaged in dressmaking during the day could enroll in a class in costume designing in order that she might become a higher grade dressmaker and command a higher wage; a domestic could enroll in some line of household instruction, but a bookkeeper who was to be married in a few months and who wanted to be taught how to cook was not, under the term of the law, eligible for instruction.

By the provisions of Acts of 1912, ch.106, evening courses in practical arts for women, whether or not engaged in occupation, may be established and maintained by any city or town, the management and control of such classes being invested in the school committee or a board of trustees. The only requirement for admission to these evening classes is that the candidate must be, at least, seventeen years of age and must be employed during the day in any line of wage-earning occupation or in housework. Only those are debarred who are not in industrial occupations and who

are not homemakers.

Acts of 1913, ch.805, an Act Relative to the Establishment and Maintenance of Continuation Schools and Courses of Instruction of Working Children. This law is known as the compulsory continuation school law, which was approved in June, 1913. This provides for the establishment and maintainance of continuation schools for the benefit of those between fourteen and sixteen years of age who are regularly employed at least six hours a day. Instruction must be for not less than four hours per week, and the time spent by a child in a continuation school is to be reckoned as a part of the time that a minor is permitted by law to work.

It is said that the purpose of the part-time, or continuations schools is to extend in some measure, until the age of sixteen, the education of the boys and girls who enter wage-earning callings at the completion of the period of compulsory schooling.

According to this Act of 1913, the immediate aims of continuation schools are, first, to train their pupils for good citizenship and to advance their general culture;and secondly, to promote vocational efficiency by courses closely related to the pupil's practical experience in a trade. Girls' continuation schools offer courses in house-arts and homemaking.

Minors who are eligible to attend continuation schools are, on the one hand, those engaged in skilled industries, and, on the other, those engaged in unskilled industries. Members of the first group are to be trained for greater efficiency in the trade in which they are employed or in preparation for another calling. Minors engaged in unskilled industries are to be directed into more remunerative callings and aided in securingemployment.

The Commonwealth also subsidizes numerous types of vocational schools above secondary grade to which entrance can be secured only by high school graduation or its equivalent. Among these are the Massachusetts Institute of Technology, the Worcester Polytechnic Institute; Massachusetts Agricultural College, the textile schools at Lowell, Fall River and New Bedford, and ten normal schools scattered all over the state.

The independent industrial schools of the State constitute practically all the free public vocational institutions of secondary grade open to those equiped with less than high school graduation and supported in part at least by appropriations made by the legislature. These independent industrial schools, whether they be day or evening, are the State-aided vocational schools of secondary grade.

## Part III.
## State-aided Industrial Schools.

There are six types of schools of this group, namely: (1) Full-time day schools; (2) Co-operative day schools; (3) Part-time day schools; (4) Day continuation schools; (5) Trade extension courses in evening schools;and (6) Practical Arts courses in evening schools.

To a remarkable degree each type of these schools is similar in essential particulars, so that an account of one would apply in large measure to all. The following is a description of some of the different types of Independent Industrial Schools.

### Full-time or All-day Schools.

In general, industrial education in Massachusetts is developing in two directions: First, the technical instruction is given in school and the practice in the trade is given in co-operated commercial shops; second, instruction and practice are to be had in the school.

The first type of industrial training has been in operation in the Beverly Independent Industrial School, the Quincy Industrial School, and the Worcester Boys' Trade School, in conjunction with the machine shops in the vicinity. This is a kind of apprenticeship system in which the school controls; the welfare of the apprentice and his educational development are placed above his commercial

productiveness. This plan is succeeding in many places, and is said to be comparatively inexpensive. The full account of this type of training will be stated later.

The second type of industrial schools--where instruction and practice are given in the school. In this State much more attention has been given to developing this form of industrial education. The Boston Industrial School for Boys, and the Trade School for Girls are good examples of this type of industrial school in this State.

(a) Boston Industrial School for Boys. According to the report of the Superintendent of Schools of Boston, in April, 1911, Mr. William C. Crawford, formerly master of an Elementary School District, was elected master of the new school, and sent to visit other cities maintaining industrial schools, and was also instructed to investigate the industries of Greater Boston with reference to educational needs.

The school was opened, March,1912, with ninety pupils in four courses,--machine shop work, wood work (cabinet making), printing and electrical work. In September, 1912, there were registered 122 pupils and in June,1913, 110 remained. In September 1913, out of these 110, 108 returned. It was also reported that 210 additional applications for admission were received in June 1913, but the limitations of the school building are such that the total attendance

has been limited to 170.

The school is intended for those boys who desire tr training that will prepare them for industrial work.Pupils will be offered an opportunity to learn the elements of a desirable wage-earning occupation and to continue their education along lines that will broaden their conception of industrial opportunity. A course of instruction at this school will unquestionably increase a boy's earning capacity. It will also give him the foundation for future development and a cultural basis for intelligent citizenship and training that he could not hope to,secure if he began work as an unskilled apprentice.

On entering the school the student is expected to make a choice of some kind of industrial work. With this choice there will go a corresponding differentiation of the technical and academic courses. If it appears, on trial, that a student's first choice was an unwise one, he may be allowed to make one or more others until he finds his place, or until it is proved that the school offers little to his advantage. The instruction is individual although the pupils work in groups. There are no regular classes. Each pupil is considered individually and progresses as rapidly as his ability will permit.

In the beginning of the second year of the course, commercial work is done in the several departments; for

example, in the printing department, all kinds of job printing; in the carpentry division, building in the school yard; in the cabinet-making division, the manufacture of single tools and machines in anticipation of future needs; in the electrical department, practical work in the installation of bells and lights in the school building. All this work is supervised by a practical man from the trade. Furthermore, instead of the work being regarded as merely disciplinary and performed without regard to time values or the utility of the product, it is viewed constantly from the standpoint of the trade, the pupil reckoning the cost of the raw materials and the value of the time spent in construction; and also studying various economic problems that pertain to the demand and supply of the product.

The work of the school is divided as follows: Shop work, 15 hours; Applied Technical Branches of Drawing, Science and Mathematics, 10 hours; and Related Academic subjects of English, Industrial History, Commercial Geography, Hygiene and Citizenship, 7 $\frac{1}{2}$ hours.

The academic work is closely related to and grows out of the shop work. For example, the drawing is made the basis of all the shop work. The head of each department is a competent draftsman, and the student is obliged

to draw everything he is to make. Before being allowed to make the products of the shop, he must first think out and express on paper every detail of the project that is to be attempted. The drawing is not pursued as a formal course, but is developed according to the project upon which the student is working in the shop. In like manner, mathematics is not formal, but is determined by the needs of the student in his shop work. He keeps a time slip, estimates the cost of materials and labor, makes working drawings, writes out specifications, requisitions for materials and tools, and after he makes the article, compares the estimate with the actual cost,and in the course in mathematics solves many problems related to these various steps. In like manner the course in science deals with the laws of matter that are basal in the shop work, omitting those portions of the subject that have only deferred value.

Thus technical and academic work, instead of being theoretical, general and largely for cultural results, is applied, specific, and chiefly for vocational efficiency, while no study is so narrow as to exclude all its cultural value.

The students admitted must be fourteen years of age and eligible for a work certificate, or graduates of the Boston elementary schools. The school year is the usual one of forty weeks. The school time, however, begins at

8:30 a.m. and extends to 4 p.m. At present a two years course is provided with a tentative course for the third and fourth years.The State Board of Education approved this school in June, 1913, so that one half the expense for instruction and maintenance will be born by the State.

Tuition is free to residents of Massachusetts. In the case of non-residents of Boston, after securing the approval of the State Board of Education, their tuition is paid one-half by the State and one-half by the city or town in which they reside.

It is reported that the school,committee has appropriated $50,000 in last year's budget (1913) for the purchase of a site, as the present building at Common Street is inadequate even for the present number that is in attendance, and voted to locate the school in the Sherwin-Comins District.

(b) The Trade School for Girls. The school was founded by a public-spirited society on 1904 and was conducted as a private school for five years. When it opened as a public school in September 1909, the pupils and teachers in the private school were transferred to the new school and the furniture and equipment of the old school was loaned to the city. Under the provisions of chapter 505 of the Acts of 1906 and the agreement between the State Board of Education and the School Committee, the state has assumed one-

half the cost of maintenance.(68,69)

This school is conducted for the purpose of giving a trade training to girls between the ages of fourteen and eighteen years who are obliged to become wage-earners. It was found that in 1910 "more than half the girls of high school age in the city were earning money, and before this movement there was no opportunity for training for Boston girls." (21) No additional requirements except that of age were made. Pupils are admitted conditionally for one month and are not allowed to continue if at the end of that time it appears that they are not adapted to that work. Non-residents are admitted, but not to the exclusion of residents.

The aim of the school is to train its pupils to,enter trades and to give them greater opportunity for development and self-support; to improve their condition morally, mentally and physically; to help them to understand their relation to industry; and to increase their general efficiency and to relate this efficiency to the life of the home.

Four courses are given--dressmaking, millinery, straw machine operating and clothing machine operating; and with each course the pupil is required the supplementary study of spelling, business forms, business English, textiles, color and design, cooking and physical exercise. Domestic science is taught in connection with the daily luncheon

at the school. The care of the body, the necessity of proper food, sleep and exercise, correct standing and sitting, and the need of fresh air and the relation of personal hygiene to success if life are emphasized. The instruction is most practical and the work is immediately and definitely correlated with the shop.

It was reported that the school more than pays for the materials used in its conduct, as the work is sold at shop prices. This also makes girls meet in the school the same conditions that they afterwards meet outside. (The aim is to make each girl appreciate that here, as in her future life, she must meet competitive conditions in the market.)

New classes are formed in September of each year and the regular term is one year in length, but a girl may enter on any school day and advance as rapidly as her own ability and application will permit; there are no classes as the term is ordinarily used, and promotions are made each and every Monday from workroom to workroom and from the school to the shop.

It is said that as the majority of the girls are eager to go to work as soon as possible, the school has a summer session of eight weeks to prepare them for placement in the fall season, and to enable elementary school graduates to go in a season by finishing their preparatory

sewing before the regular fall term opens.

On emtering, each girl fills out an application-blank regarding herself and her family. The girl's home is visited to obtain a more intimate knowledge of her circumstances, and she is advised as to the best choice of industry. It requires about a year for a girl to reach a satisfactory standard of proficiency. Each girl is helped to reach a place in a permanent position, and a record is made of her position and the wage promised. Her employer is asked to report after two weeks. Twice a year a letter with a return post card enclosed is sent to girls who have been placed from the school, concerning their present position and wage, for the purpose of noting their progress and testing the value of the school training.

During the year ending in June, 1913, the total enrollment was 606. Of these, 383 took up dressmaking; 130 took up millinery; 59 took up machine operating; 17 took up catering; 7 took up trade design; and 8 took up novelty work.

The increased efficiency of the training results in increased wages for the girls when they are placed in the shops, as the following figures will show:

| | Enrollment. |
|---|---|
| 1909-10 | 272 |
| 1912-13 | 604 |

Average beginning wage.(a week)

| | |
|---|---|
| 1909-10 | $4.75 |
| 1912-13 | $6.50 |
| 1913-14 | $6.75 |

The teaching corps comprises a principal, first assistant, assistant, vocational assistant, trade assistants, helpers and aids, 41 in all at present.

The hours of sessions are from 8:30 a.m. to 5 p.m., daily; an average of five and one half hours daily is devoted to trade instruction and an average of about two hours to academic work.

The school is in a building at 620 Massachusetts Ave. It contains four stories. The offices, show-rooms and reception room are on the first floor. On this floor also is the electric pwwer machine room, one section of which is used by the operators on straw hats and the other by the classes in machine garment making. The second floor contains the school assemblt hall, where the classes in physical exercises have their sessions. There are the classrooms and workshops of the advanced classes in millinery and dressmaking on this floor. On the third floor there are rooms and shops for the classes on plain sewing and dressmaking, and on the fourth floor are the rooms for preparatory sewing, color study, and design.

The school has three governing boards, the State

Board of Education, the Boston School Committee and an Advisory Board of men and women interested in trade education, who keep the school in touch with the business world and watch closely the administration, methods of work and output of the school.

Independent Co-operative Day School.

In schools of this type, practical trade instruction is given in commercial shops while the scientific, technical and general instruction is provided in the school room. The following is a good example of such a plan.

Beverly Industrial School. This school is operated under the provisions of Chapter 471 of the Acts of 1911, and offers instruction in one department only, namely, Machine Shop Work. Related instruction is also given in drawing, mathematics, science and English.

Pupils admitted must be residents of Beverly, at least fourteen years of age, and have passed the sixth grade in the elementary school or its equivalent. They must also obtain from the school physician a certificate to the effect that they are physically able to perform the work to be undertaken. Mr. Safford, the former Superintendent of Schools of Beverly, gives a full account of this school. The following is an extract from its descriptive portion.

The ordinance establishing the school was passed in May, 1909, and the school was opened in August, 1909. The purpose of this school is to provide a proper supply of competent journeymen mechanics who possess the necessary all-round skill and experience for tool and jig making. It is no part of their present purpose to make foremen, engineers or inventors. The purpose is rather to fill up the "rank and file", not to provide "officers of the line" (51).

The board of control of this school is an independent Board of Trustees. The trustees consist of the Mayor, the chairman of the School Committee and the assistant superintendent of the works of the United Shoe Machinery Company at Beverly. The assistant superintendent of the factory as chairman of the committee on instruction and the Superintendent of Schools as executive officer of the Trustees have directed the operations of the school subject to the approval of the Board of Trustees. While the management of this school is independent of both the factory and the high school, it has access to both and shares in the facilities that they both offer in equipment, organization, established standards of discipline, workmanship and general efficiency.

At present, the school instruction is carried on in the high school building, McKay and Balch Streets, main-

tained by the city of Beverly, and the shop work is carr
ried on as a separate depattment organized in the factory of the United Shoe Machinery Company.

The general arrangement between the trustees and the United Shoe Machinery Company is as follows: The company has organized in the factory a separate department devoted exclusively to the school and has equiped it fully with the necessary machine tools for a general machine shop to accomodate about forty workmen at one time. The company furnishes the raw material and drawings for the work to be performed and purchases the products turned out by the boys who are working on this plan. One-half the piece price for the manufactured product is paid to the pupils and the other half goes to the company for the maintenance of the shops. In case there is a profit, it is to be distributed in increased wages or in any other way that the trustees may determine. In case of deficit between the earning of the practice shop and the cost of the maintenance of the same, the United Shoe Machinery Company will bear the expense. The company also pays the school instructor when he is acting as foreman of the "school job".

On the above plan about sixty boys are alternating as part-time pupils, one week at the shop and one week at the schoolroom. It is considered that the piece-price system is the best system for the pupils in this school,

because the pay envelope is to the pupil a constant measure of his productive efficiency both in utilization of time and in standards of workmanship. If he wastes time, he does not turn out so many pieces; if he is inaccurate in workmanship the pieces do not pass inspection. Thus the importance of a proper balance between time and good workmanship is constantly impressed upon the pupils. The hours and discipline at the factory are in general the same as those required of a regular workman. This has been insisted upon by the management of the school, although suggestions have been made by outsiders that the hours should be shorter on account of the youth of the pupils. The management of the school thinks that it is best for the pupils to take the factory hours and discipline as they would find them if they came to work as individuals. The hours in the shop are from 7 to 12, 1to 5, except Saturdays,-that is, 50 hours a week, having 9 hours a day. In the school-room the hours are from 8 to 12, 2 to4 except Saturdays. The school-year is fifty weeks. The length of the course of study has not been determined but it is expected to be three or four years, depending greatly upon the ability of the pupil. The course of study is correlated with the shop work as the major center of correlation, and with the pupil's duties to himself and society as the minor center of correlation. The principal features of the

course of study adopted are as follows: Shop mathematics, mechanics, chemistry of the different kinds of materials used in the factory, freehand sketches with the dimensions, blue-print reading, mechanical drawing, English, civics and industrial economics, and business forms and practice.

The school is very similar to the University of Cincinnati and the Fitchburg plan, for the half-time idea was adopted from the start of this school. The pupils are in two divisions, which continue alternating one week at the factory and one week at the school, but at the factory they are in a different department and do not come in contact with regular foremen or workmen, and at the school they are in separate classes with separate instructors, different hours and wholly different entrance requirements and course of study. This school is radically different from the Fitchburg plan in the fact that through a unique scheme of co-operation the trustees of the school retain full control of the pupils while in the factory, and the same person instructs a particular division in both factory and school. It is claimed that, by this means, the work is conducted ina way to contribute most effectually to the boy's progress in his trade and not to suit the exigences of the factory, and the instruction is imparted by a trained teacher and not left to the uncertain pedagogical ability of the ordinary foreman. (51)

The instruction at the factroy is individual and comprises the operation of the different machine tools on various materials. At first the pupils at the factory manufacture simple machine parts, using jigs and other labor-saving devises as in other parts of the factory. Gradually they learn to set up their own work and as fast as they gain confidence and become proficient on one machine, they are changed to another.

An initial course of about two years in the theory and practice of the general machinists' trade is contemplated. It is said that this work is not specialized for this particular industry, that is, shoe machinery, but would be available in any general machine shop. It is expected after the cmmpletion of the initial course that an advanced course of one or tweo years may be taken such as the following: Specialization of some branch of the machinists' trade, in the use of instruments of presision, pattern making, moulding, and casting, forging, tempering, machine drawing, setting up and demonstrating shoe machines Each pupil keeps a note-book in which he writes a description of each article manufactured by himself, dwaws a freehand mechanical drawing of it with dimensions, and describes the operations in its manufacture and the tools used.

When the week at the factory is over the machinist

instructor accompanies his class to the school-room for the following week and gives instruction for five hours daily, except Saturday, in various kinds of drawing, shop mathematics, machine shop practice, and note-book records of the work done at the shop. Other instructors from the high school staff give instruction for three hours daily in science, business and social practice, and in personal, social and civic duties.

This plan of having the machinist instructor accompany his class both in the school and in the factory, is claimed to be very advantageous. The theoretical work can be made more available for immediate application and the shop work can be done with a more intelligent regard to the principles, mathematical or otherwise, that underlie it. It is said that the dual experience is good for the instructor also. The work at the factory keeps him from impractical theoretical instruction in the school and the teaching in the school gives him the pedagogical insight necessary to avoid being a superficial and ineffective instructor in the shop.

The machinist instructor has charge of the class from 8 to 12 and from 1 to 2. Part-time specialists have charge of the class from 2 to 5. In general, the machinist instructor teaches the subjects belonging to the major center of correlation, the shop work, while the special part-time

instructors deal with the subjects belonging to the minor center of correlation,- the pupil's obligations to himself and to society--citizenship.

But the difficulty of such a school is said to,be the large expense. With the shop practice self-supporting, it costs $80 per pupil a year. The machinist-instructor receives $30 to $35 per week; the part-time specialists, $1 to $1.50 an hour for 15 hours a week. There are 50 weeks in the school year. Securing suitable teachers is also a very great difficulty in this school. The two machinist-instructors were chosen from the 3500 employees of the United Shoe Machinery Co. The part-time specialists are mainly high school teachers already fully employed who have been drafted into service to meet the need.

At present the teaching force is five in number; sixty boys are alternating as part-time pupils, one week at the shop and one week in the school room, and seven are pupils on full time at the shop, not yet released from the school. There are thirty-five graduates of the school.

Part-time Schools.

This type of school is intended to give instruction in related technical and academic subjects to students employed during the day. Such instruction is given during a part of their working time". Up to the present time this type of school has been conducted to a limited degree and

has been mainly in connection with the machine shop industries. At present there two in the State. These are:

Quincy Industrial School.

Worcester Boys' Trade School.

Following is a short description of the Quincy Industrial School.

This school is supported by an annual appropriation made by the city council. It is housed in the same building with the Quincy Full-time Co-operative School, and is operated under the provisions of Chapter 471 of the Acts of 1911, and offers instruction in the following departments:- Machine construction and Gear construction.

The school is in session from 2:30 to 4:30 on Saturday afternoons. The school year begins the middle of September and closes the last week in June. The length of the course is three years. One teacher's time is devoted to the instruction, and the total number of pupils enrolled is ten.

Evening Industrial Schools.

The general principle underlying the establishment of evening industrial schools has been that they should not induct into a trade, but should aid the person already engaged in an occupation to further perfect himself in his trade. For this purpose such courses are restricted to

persons over 17 years of age already engaged in industry. Up to the present time the most efficient work has been done in a so-called "short unit course". Such a course takes a grpup of students all engaged in the same occupation and having about the same degrees of experience, and undertakes to give them directly some one thing which they need; for example, drawing and estimating for carpenters, or tool design for tool-makers, and so on. The following is an example of these evening industrial schools.

(a) Boston Evening Industrial School,for Boys.

The work done in the Central Evening Industrial School is said to be the outgrowth of the work done in the free evening drawing schools which have been maintained since 1870. In 1908 these drawing schools were discontinued as such and were organized as a Central Evening Industrial School. The school was established in 1908 in accordance with an order passed by the Boston School Committee. This school has four branches located as follows: The Central School is housed in the Mechanic Arts High School building where it occupies eight rooms of the shop. The Roxbury branch occupies five rooms in the old Dearborn School on Dearborn Street. The Brimmer Branch occupies about eight rooms of the Brimmer School building, on Common Street. The East Boston Branch occupies two rooms of the East Boston High School building in Marion Street? The Hyde Park

Branch occupies one room in the Hyde Park High School building.

The central school and the four branches are so located as to be easily reached from all parts of the city. In the Mechanics Arts building the equipment for industrial training is supposed to be one of the best in the United States. The corps of instructors comprises professors from the Institute of Technology, instructors from the Mechanic Arts High School, and practical mechanics holding responsible industrial positions.

The Evening Industrial School is operated under the provisions of Chapter 471 of the Acts of 1911. The school aims "to increase the efficiency of those who wish to become more familiar with various processes and parts of their trades closely allied to their own." The majority of the pupils are men who have spent years in their trades and wish to learn machines , methods and processes which have been invented since their apprenticeship.

The school session is from 7:30 to 9:30 on Monday, Tuesday and Thursday evenings. The school year begins the first week in October and closes the last week in March. The vacation is three weeks in December. The full certificate course requires three years' attendance.

No examination is required on entrance, but the pupil must be over seventeen years of age and not in attendance

in a day school in Boston, who is able to profit by the instruction. In general, it is understood that in order to profit by the instruction offered in a given course, the pupil must be so employed as to have opportunity to practice a calling the same as or closely allied to the one he elects to study at the school. No pupil is admitted who is unable to attend at least two evenings each week, except by the permission of the Director of the Evening and Continuation Schools. Instruments are learned and necessary supplies are furnished to the pupils without expense.

A record of each student's work is kept by the instructor and a copy of all class records is filed with the principal. All class-room work, carefully marked, is retained until the completion of the year's work when the marks and specimens are returned to the pupil. The School Committee reserves the right to retain specimens of pupil's work for purposes of record or exhibition.

The courses of study are carefully arranged to meet the practical needs of the pupils who are engaged in industrial work, and also for those who wish to equip themselves for more responsible positions. The school offers instruction in the following courses:

Drawing for machinists, boiler makers, pattern makers, tool makers, carpenters;and sheet metal workers; drawing and estimating for carpenters; tool design for tool makers;

steam engineering for janitors, firemen and engineers; forging for repair men and blachsmiths; shop work for machinists; shop practice for mill men and inside finishers printing for compositors and job pressmen; shop practice for sheet metal workers; industrial design for photo engravers, jewelry workers, and commercial designers; interior decorating for painters and decorators.

The board of control is the Boston School Committee. The number of teachers giving instruction at present is 41, and the number of pupils enrolled is 629.(5,67,69).

(b) Evening Trade School for Girls.

The Boston Evening Trade for Girls was opened October 2, 1911, as an independent evening industrial school for girls, and is operated under the provisions of Chapter 471 of the Acts of 1911. It is housed in the building occupied by the Trade School for Girls and uses the same equipment.

The school session is from 7 to 9, on Monday, Tuesday and Thursday evenings. The school year begins the first week in October and closes the last week in March. The vacation is two weeks at Christmas.

The courses of study are as follows:

Cloth power machine operating for operators and seamstresses; straw power machine operating for operators and milliners; cooking for housewives and house daughters;

dressmaking for dressmakers and seamstresses; cutting and fitting for dressmakers and seamstresses; millinery for milliners and dressmakers.

Announcement of courses for the term of 1914-1915 is as follows: The evening school is open and free to women residents of Massachusetts who are over seventeen years of age, not attending a public day school and employed during the day in occupations closely allied to the courses offered. Courses are offered as follows:

For Power Machines Operators, Dressmakers or Milliners

Straight stitching for speed
Garment constructing
Button-hole machine operating
Tucking and hemstitching
Machine embroidery
Straw machine operating

For seamstresses and Dressmakers:

Cutting and fitting of linings
Skirt making and finishing
Waist making and finishing
Sleeve making and finishing
Tailored finishing
Costume sketching and designing

For Seamstresses or Milliners:

Millinery sewing
Frame making and covering
Trimming and bowmaking
Copying of models

For Needle Workers:

Smocking and embroidery stitches
Neckwear
Garment construction

For Housekeepers, Helpers, Waitresses or Brides-to-be

Plain cooking
Fancy dishes
Cake and pastry
Use of left-overs
Economical buying and making

These courses are adapted to meet the individual needs of students and the instruction is directed toward securing the training desired, whether it be skill in the use of a machine or in new methods of handwork.

Miss Florence E. Leadbetter, Principal of the school, tells us that instruction in cloth machine and straw machine operating was offered to those who were then employed as power machine operators or in closely allied vocations, an opportunity being given them to learn the types of machine with which they were not already familiar, and to increase their efficiency in the work they were then doing. She also says that the machine equipment in the school was not sufficient to accomodate all who applied and there was a large waiting list throughout the greater portion of the year. There is a great demand for power machine operators. The conditions of employment in most places are excellent and positions for skilled workers are well paid. The demand for training in these trades will probably increase.

It is found that the principle difficulty connected with evening classes in these subjects is the fact that the pupils are workers who are so fatigued from their day's

work that intensive instruction in the evening is less valuable than it would be otherwise. For this reason, the principal hopes that eventually the younger workers in these callings will be given opportunity during the day-time to secure the necessary training in continuation schools.

In regard to a course in cookery and household management and domestic economics for homemakers, housekeepers, and domestics, she says: those who applied for this course were almost without exception young women who were looking forward to the assumption of homemaking in the very near future. Although the instruction was most intensive, it was in fact recreative to the pupils, since it was a decided change from the dutied of the day, and the element of fatigue was not as apparent in this class as in the others. She insists that without question, courses of this sort should be supplied in the city just as rapidly as the demand is sufficient and funds will permit.

It is also reported that many of the day school girls, after going into the shop, return for more training to increase their efficiency and to raise their pay.

From October 1912 to April 1913, 335 women were enrolled in the evening classes, distributed as follows:

| | | | |
|---|---|---|---|
| Dressmaking | 106 | Cutting and fitting | 20 |
| Millinery | 63 | Cooking | 35 |
| Machine operating | 111 | | |

Practical Arts Courses.

Evening courses in women's work have been largely conducted throughout the State. As before stated, the restrictions placed upon the attendance on State-aided evening courses operated under Chapter 471 of the Acts of 1911, have prevented the attendahce upon such courses of girls engaged in wage-earning occupations during the day who were not engaged in household occupations. Thus the girl working ina factory, the telephone operator, or the stenographer who have been unable to avail themselves of the opportunity offered by State-aided evening courses for training for efficiency in the home. In recognizing the desirability of such training the Legislature of 1912, enacted chapter 106, making possible the operation of State aided courses giving training for domestic efficiency to women and girls employed during the day without regard to the character of that employment. The following is a short description of this type of school.

Boston Evening Practical Arts Courses.

These classes are operated under the provisions of Chapter 106 of the Acts of 1912. They are given in fifteen of the elementary and grammar school buildings throughout the city, in which they occupy a few rooms. These schools are: Abraham Lincoln; Bigelow; Comins; Dearborn; F.W.Lincoln Franklin; Hancock; Hyde Park; John Cheverus; Lyman; Mather;

Phillips Brooks; Warren; Washington; Washington Allston.

These practical arts courses were given approval by the State Board of Education in June 1913, and offered instruction in the following courses:

Dressmaking; millinery; embroidery and cooking.

The majority of these classes are in session from 7:15 to 9:15; some of them are from 7 to 9, and others from 7:30 to 9:30 on Monday, Tuesday, Wedmesday and Thursday evenings The school year usually begins the first Monday in October and closes early in April, with a vacation of three weeks at at Christmas.

At present the number of teachers giving imstruction is is forty-two. The number of pupils enrolled is one thousand and ninety-five.

## Part IV.

### High Schools with Industrial Departments.

Together with already mentioned special legislation for independent industrial schools, the wide authority conferred upon the school committees under the general status has made possible the establishment of a large number of these departments, some of which are being carried on by the community at its own expense, usually in conjunction with the regular public schools. This system has taken, in general, the form of introducing into the high school spaeial courses training for industrial efficiency. The older form has been the establishment either of a technical course within a high school or of a technical high school; but more recently it has taken the form of part-time work based upon the Cincinnati system.(18) (Boys electing this course are placed in various local shops and alternate on a weekly basis between the shop and the school.)

For example, in Boston, of the fifteen highschools of the city, two are classical,- the Public Latin and the Girls' Latin. Two are vocational,- the High School of Commerce for Boys and the High School of Practical Arts for Girls. One, the Mechanic Arts High School, is a socalled "manual training high school", and the rest are general high schools, in many of which vocational or semi-vocational courses are given. School document no.10, 1913, reports

that, in seven of the general high schools, there are coursesin manual training which are very different and unequal. There is a good equipment at Dorchester and a fairly good one at East Boston.(69) The Hyde Park High School is adequately equiped. The other high schools have meager equipments. The courses of instruction of these schools are briefly as follows: At Brighton High, a course in mechanical drawing and applied woodwork, the girls taking art metal work to which the full time of one instructor is devoted; West Roxbury High, bench work in wood, and mechanical drawing for both boys and girls, the full time of one instructor; South Boston High, bench work in wood, mechanical drawing and art metal work in limited amounts for boys and girls. This work is done in one room and receives only a small part of the time of one instructor. Charleston High offers bench work and something of boat building and electricity in one room on the part time of one instructor. (69). East Boston High offers mechanical drawing and shop work, not only wood working and art metal work, but some machine work in two rooms with the full time of two instructors. Dorchester High provides an intensified course in woodworking and hand power, including turning and cabinet making, also art metal work and machine shop practice. Three rooms are used and the full time of two instructors is devoted to the work. At Hyde Park school, in one class

room and the library, mechanical drawing is conducted on the full time of one instructor and a part of the time of another. The school work for advanced students in the industrial course is done in cooperation with outside commercial shops.

These facts concerning the organization of the manual training work in the high schools show the great variance that exists in the courses followed and the need of either eliminating this work from most of them or putting it on a much more intensive basis.

Recently, in Boston, the teachers of the department of manual arts have frequent meetings with the heads of the department, and a course is now being formulated and discussed. The following ten propositions were submitted by the manual arts council of high school teachers last year, (1913). Their agreement was as follows:(69)

"1. The boys and girls be in separate classes in the first year shop work of the high school.

2. Pupils in first year shop work take the shop work always in the same group.

3. Only one line of shop work be carried on in one period by the same teacher.

4. There be in the high school a four year manual arts course for boys, which shall meet the requirements for a diploma. The first year shop work should be part of

this speaail manual arts course.

5. First year shop work be offered as an elective in all courses.

6. The four year manual arts course have for its primary aim the preparation of boys for industrial life.

7. The department of manual arts be requested to establish a standard of marks in the manual training of the eighth grade.

8. Boys who have completed the eighth grade manual training but without a satisfactory mark should be discouraged from entering the special manual arts course in the high schools.

9. Visits be made to manufacturing establishments during the first year of the manual arts course.

10. The first year course in manual training in the high schools be a thorough course in woodworking, including the use of accessory material, consisting chiefly of hand processes carried out as far as possible on products for use in the schools and in the community.

A further account of the course which is in operation in the Hyde Park High School might show an idea of a high school with a socalled intensified course of manual training.

Hyde Park High School.

In Hyde Park High School there are about thirty boys

taking this course. This course was started in 1912, so in 1913 there was only one class. The course of study is as follows:

First year.---The subjects taught in the first year are: English, 4 periods; Shop mathematics, 4 periods; Drafting, 6 periods; Elementary Science, 4 periods; Shop Work, 6 periods; Military Drill, 2 periods; Music, 1 period Total, 27 periods.

In the first year, as a part of the regular work, frequent excursions will be made to various industrial plants, and during the last half of the year, one afternoon each week is to be devoted to work in some manufacturing establishment in Hyde Park without pay.

Second year.---English, 3 periods; Shop Mathematics, 3 periods; Physics, 4 periods; Machine Drafting, 6 periods; Military Drill, 2 periods; Music, 1 period; Co-operative Shop Work in some Hyde Park manufacturing establishment, 2 1/2 days each week,-Friday, Saturday and Monday,- with the pay of an apprentice. Total, 19 periods and Shop Work.

Third year.---English, 3 periods; Shop Mathematics, 3 periods; Chemistry, 4 periods; Machine Drafting, 4 periods; Military Drill and Music, 3 periods; Co-operative Shop Work, 2 1/2 days. Total, 17 periods and Shop Work.

Fourth year.---English, 3 periods; Shop Mathematics, 3 periods; Machine Drafting, 4 periods; Military Drill

and Music, 3 periods; Co-operative Shop Work, 2 1/2 days. Total, 16 periods and Shop Work.

In the third and fourth years Spanish, German or French may be elected in the place of Military Drill and Music (3 hours each week).

Not only in Boston but throughout the State, there are numbers of high schools with industrial departments or intensified manual training courses,- most of them with the socalled "school shop" plan and some of them with the co-operative plan. Among them Fitchburg High School will be the best example of this type of high school, since it is so commonly known as the "Fitchburg plan". The following is a short description of it:

Fitchburg High School

This is not an Independent Industrial School but a high school with a co-operative industrial course, and differs from the Beverly Co-operative School already mentioned in the fact that the latter aims to give an elementary course of instruction to the pupil, while the Fitchburg school aims to give boys of high school age an opportunity to learn a trade and at the same time continue their school training. The pupils attending the Fitchburg school are employed by the several manufacturing establishments of that city, instead of by one large corporation, as in Beverly. According to Mr. McCann, the concerns operating in

this way in that city in the last year,(1913), were fourteen in number, and the number of industries in which the boys were employed were ten, such as: machinist, pattern-maker, sawmaking,drafting, iron molding, tinsmithing, piping, printing, textile and office work (37). Again this school differs from the Beverly plan, for the reason that the pupil must spend the entire first year of the course in the high school.

Mr. Hunter, (26), director of the Industrial Department of the Fitchburg High School, tells us of the beginning of the school as follows:

"Mr. Daniel Simonds, president of the Simonds Manufacturing Co., and several other Fitchburg manufacturers, were present at a meeting in New York when Prof. Herman Schneider, dean of the college of engineering of the University of Cincinnati, explained his system, and the simplicity and practicability of the plan appealed to them immediately. Here was a method that could be adapted to high school students who wished to learn a trade and continue their education at the same time. And so on..."

The department was opened in September 1908, with 18 pupils who preferred this course. The general arrangement of the plan is briefly as follows:

At present, the length of the course is four years, the same as the regular high school course. The first year

is spent wholly in school; in the next three years the boys alternate between shop and school weekly. Three summers are spent in the shops, beginning with the close of the first year in June. The first summer is a trial period of two months and each candidate is thoroughly tried for his fitness and adaptability for the trade. During this period he is privileged to consult with his school instructor and if his instructor and the employer believe it is to the advantage of the boy and the employer to learn the machinist trade, he then becomes regularly indentured to the employer.

This scheme is carried on with the employers by prospective apprentices in the several shops until the first of September. At this point the actual co-operation begins with each boy's spending a week in the shop and the alternating week in the school. (The manufacturers and employers take the boys in pairs, so,that, by alternating, one of the pair is always in the shop during the regular shop hours, while the other is in school.) On Saturday the boy who has been at the school during the week goes to the shop and works during the morning, so as to be prepared on Monday to continue without interruption the work on which his mate has been working. From Monday to Friday one boy spends the entire day inthe factory and the other attends school from 8 to 1 o'clock, and three hours per week of

home studynare required of each boy during his school week. During the year each boy spends 5 days a week for 20 weeks in the school and the equivalent of 5 1/2 days a week for 20 weeks in the shop. In addition he spends 8 weeks of his summer in the shop, 2 weeks being allowed for vacation.

About compensation for work, Mr. Hunter tells us that the boys receive pay for the weeks they are at work at the following rates: for the first year, 10 cents an hour; the second year, 11 cents an hour; and the third, 12 1/2 cents an hour; making $5.50 a week, or $165 for the first year; $6.05 a week, or $181.50 for the second year; and $6.87 a week, or $206.25 for the third year; a total of approximately $550 for the three years of shop work. He says, "Here then is a strong inducement for the boy to continue in school; he can earn some money--in fact, he gets more t than he could by going out and taking the ordinary jobs in stores and offices. When there is a vacation week in school work is provided in the shops for those who wish to work and their earnings are correspondingly increased."

Academic subjects studied by industrial students, is divided into 40-minute periods and cover the entire period of the apprenticeship, as follows:

First year.--The subjects taught in the first year are: English and current events, 5 periods; arithmetic, 5 periods; algebra, 5 periods; freehand mechanical drawing

with bench work, 8 periods. The school studies relate closely to the shop work.

The laboratory work which the pupil receives during the first year consists of instruction in the operations of lathes, planers, drilling machines, with bench and floor work and such other machine work as pertains to the particular branch of machine-shop practice as will be applicable to the particular branch of the machine industry in which the apprentice expects to be employed. This laboratory practice is continued throughout the entire four years of the co-operative school course.

Second year.--English, 5 periods; shop mathematics, 5 periods; physics, 4 periods; civics, 2 periods; mechanism of machines, 5 periods; free-hand and mechanical drawing, 6 periods.

Third year.---English, 5 periods; shop mathematics, 5 periods; chemistry, 4 periods; physics, 4 periods; mechanism of machines, 5 periods; first aid to the injured,1 period; free-hand and mechanical drawing, 6 periods.

Fourth year.---English, 6 periods; commercial geography and business methods, 2 periods; shop mathematics, 4 periods; mechanism of machines, 4 periods; physics, electricity and heat, 4 periods; chemistry, 6 periods; free-hand and mechanical drawing, 5 periods.

These studies are closely correlated with the shop

work. The English studies include forms of business papers and business English. A close study of shop terms and their significance is an important feature of the school work. Industrial history includes the study of daily happenings in the industrial world, the history of the iron industry, the factory system, new inventions, and a close study of mechanical journals.

Shop mathematics deals with problems on cutting speeds and feeds, gearing, strength of materials, and general cost finding. Mechanism includes the study of the laws underlying mechanics; the study of working examples is emphasized. Chemistry takes up the nature and qualities of metals and salts, and tests that can be ordinarily applied to fractured metals, hardening, tempering, and improving processes.

Commercial geography includes the study of the source of supplies for various industries, methods of transportation, cost of materials, railway systems, waterways, and so forth.

Concerning the graduates and the number of students, it is found that in the five years of its operation (up to 1913) the total number of graduates was 49 and the total enrollment in five years was 134 pupils. The yearly classes, with their enrollment, have been as follows: 1908-09,334; 1909-10, 15; 1910-11, 30; 1911-12, 25;

total, 134.

It is also found that the occupations to which the boys have been assigned during the five years were as follows:

| | | | |
|---|---|---|---|
| Drafting | 8 | Printing | 2 |
| Iron molding | 4 | Saw making | 10 |
| Machinist | 86 | Textile work | 8 |
| Office work | 6 | Tinsmithing | 4 |
| Pattern making | 6 | | |

As for the wages of the graduates, the average wage of the graduates has not been determined, but no graduate is now working for less than $2 a day, and one is employed at his trade at a salary of $40 a week.

Occupations of Graduates.

| Engaged as-- | Class of | | | |
|---|---|---|---|---|
| | 1911 | 1912 | 1913 | 1914 |
| Assistant to superintendent | ..... | 1 | ..... | |
| Draftsman | 4. | 1 | 2 | |
| Elevator inspector | 1 | ..... | ..... | |
| Instructor of physical training | 1 | ..... | ..... | |
| Machinist | 9 | 3 | 6 | |
| Office worker | 1 | ..... | 1 | |
| Saw maker | ..... | 3 | 2 | |
| Tinsmith | ..... | ..... | 1 | |
| University student | 4 | 2 | 7 | |

## Technical High Schools or Manual Training High Schools.

Technical high schools may be defined as "schools giving training in practical industrial processes or instruction in the scientific and mathematical principles upon which these processes are based, whose purpose is not to prepare pupils for the trades, but rather for entrance to higher scientific schools."

Among this group of schools, there are such schools as the Mechanic Arts High School, and the High School of Practical Arts for Girls in Boston, Springfield Technical High School and Newton Technical High School.The following is a short description of this type of schools.

### Mechanic Arts High School of Boston.

This school opened is September 1893, It is claimed that the class in wood-working, organized in 1882 in the North Bennet Street Industrial School by Mrs. Quincy A. Shaw, may properly be regarded as the precursor of the Mechanic Arts High School.(70)

There has been a wide difference of opinion about what should be the purpose of this school. Some have supposed that the pupils of this school would become high grade mechanics, and the school aims to provide the best training that a public secondary institution can give to graduates of elementary schools who desire to prepare for

efficient service as intelligent and skilled mechanics, draftsmen, designers, foremen, superintendents, architects, engineers or agents of whatever name, charged with ever-increasing responsibilities in connection with the many activities of the complex industrial life of today. But the statics of its alumni do not lead to such a conclusion. (52). The graduates find occupation of the same character and diversity as the graduates of general high schools. It is claimed by others that there is not sufficiently close relation of the academic studies to shop problems to develop a compelling interest in the shop, and the shop work itself is not sufficient to develop technique and is not concerned with a commercial product.

The "Report on Manual Training" for 1904, (10), says as follows: "The distinction between a manual training high school and a trade school should not be over-looked. A trade school aims to teach thoroughly any one of many trades as rapidly as the students' ability will permit. No instruction is given that will not bear directly upon the chosen trade. Obviously the choice of occupation must be made on entering the school. If experience demonstrates that the choice is unfortunate, a change necessarily involves considerable loss of time. If a boy begins to learn the carpenter's trade and discovers, after a time that he has special aptitude for sign-painting, the

time spent at the bench will not shorten the period required to acquire skill with the brush. The functions of the trade school are strictly special; general education does not fall within its scope.

"The manual training school, on the contrary, teaches the elements of mechanic primarily on account of their educational value, just as arithmetic and geometry are taught. It does not have vocational aims directly in view, but the manual dexterity and the knowledge of tools, materials, drafting, and methods of construction acquired at school serve to advance boys many stages toward the mastery of any trade. The combined experiences of the class-room and the work-shop enable boys to form correct judgments concerning their fitness for a given employment. Moreover, their elementary but systematic knowledge of the entire field of mechanic arts gives them the same advantage in dealing with the difficult problems of any trade, that a liberal education gives to the student of law or medicine."

The object of the Mechanic Arts High School (69)"is to furnish systematic instruction in the elements of the mechanic arts, and in drawing, in connection with a thorough high school course which provides for a large amount of work in mathematical and scientific branches."

The course of study: The instruction is given in the principles of woodworking, forging and machine shop practice

About one-third of the time is devoted to practice in the school wood-working, machine and forge shop, and two-thirds to the usual high school subjects.

The courses offered are: Free-hand and mechanical drawing; industrial design; carpentry; wood carving and wood turning; pattern making; forging; machine shop work; industrial physics. Other academic subjects are given.

Mechanic Arts High School.

Program of studies.

First year.

| Academic Dept. | Hrs. per week | Mos. | Mechanic Arts Dept. | Hrs. per week | Mos. |
|---|---|---|---|---|---|
| Algebra | 5 | 10 | Drawing | 5 | 10 |
| General history | 2 1/2 | 10 | Carpentry | 10 | 7 |
| English | 2 1/2 | 10 | Wood-carving | 10 | 3 |
| **Second year.** | | | | | |
| Algebra | 2 1/2 | 10 | Drawing | 2 1/2 | 10 |
| Plane geometry | 5 | 10 | Wood-turning and pattern making | 10 | 5 |
| History of U.S.and Civil government | 2 1/2 | 10 | Forging | 10 | 5 |
| English | 2 1/2 | 10 | | | |
| French | 2 1/2 | 10 | | | |
| **Third year.** | | | | | |
| Solid geometry | 5 | 5 | Drawing | 2 1/2 | 10 |
| Plane trigonometry | 5 | 5 | Machinist work with hand tools mainly | 5 | 3 |
| Physics | 2 1/2 | 10 | With machine tools mainly | 5 | 7 |
| English | 2 1/2 | 10 | | | |
| French | 5 | 10 | | | |
| **Fourth year.** | | | | | |
| Trigonometry.Application to physics, | | | Drawing | 2 1/2 | 10 |
| | | | Machine shop practice | | |

| | | | | | |
|---|---|---|---|---|---|
| surveying and navigation | 2 1/2 | 10 | projects involving shop work of preceding year | 10 | 10 |
| Physics laboratory work | 2 1/2 | 10 | | | |
| Chemistry | 5 | 10 | | | |
| Algebra | 2 1/2 | 10 | | | |
| Geometry | 5 | 10 | | | |
| History of the U.S. | 2 1/2 | 10 | | | |
| English | 2 1/2 | 10 | | | |
| French | 5 | 10 | | | |
| German | 5 | 10 | | | |

Fourth year pupils may specialize in machine design, industrial design, or architectural drawing.

In general the subjects of study during the first three years are the same for all, but the amount of work required in each subject is proportioned to the varying degrees of ability displayed by the pupils. The subjects specified for the fourth year, with the exception of English, are optional. Candidates for diplomas are required to take throughout the year the equivalent of fifteen hours per week in the academic department, and twelve and one-half hours per week in the department of mechanic arts.

A pupil admitted must be a graduate of a Boston elementary school or an equivalent education satisfactory to the Board of Superintendents. The school session is for five and three-fourth hours per day for five days in a week, September to June. Length of course is four years. It is free to residents of Boston; non-residents pay tui-

tion, the rate of which is determined by the School Committee each year.

At present the number of teachers is 48, with 19 special assistants in the mechanic department. The average number of pupils belonging is 1417.(1913)

The school is located at Belvidere and Dalton Streets in Boston.

Full account of this school can be found in the "Report on Manual Training" by the School Committee of Boston,1904; and School Document No. 3, 1906.

The High School of Practical Arts of Boston.

This school was founded in September, 1907. The school aims (1) to prepare the pupil in the subjects that underlie practical arts of the household and (2) to provide definite industrial training for those who wish to enter some skilled trade. It differs from a purely industrial training or that given in a trade school in the large proportion of academic work given. The school is under the School Committee of Boston, and is supported out of public school funds. Tuition is free. A Grammar School diploma or an equivalent education satisfactory to the Board of Superintendents is required for admission. The school offers instruction in such subjects as English, history, mathematics, chemistry, physics, economics and drawing, and in

addition it offers specialized instruction in household science, dressmaking and millinery.

The Boston School Document, No. 10,1910, (69), reports fully concerning this school and says:

"The high school of Practical Arts is conducted on the belief that woman's most important function in life is that of the sweet ordering, arrangement and decision of the home. The school, therefore, aims to prepare all its pupils to meet the conventionalities of home life, to give them direct training in the forming of judgments of the type required for home-making and to ground them thoroughly in the subjects that underlie the practical arts of the household. It is recognized that many of the pupils will not go directly from the school to the home, but will, from choice or necessity, for a shorter or a longer time, earn a livelihood in industrial pursuits. Therefore the school also provides definite industrial training of high charatter. The school in its upper classes is divided into two groups of pupils pursuing somewhat different courses, both being trained, however, for home-making, though one expects to spend more or less time in industrial work. The latter group receives trade instruction in some branch of industrial labor paying good wages to women."(69)

Connected with the school is a model home containing a kitchen, living room, bedroom and bath, all suitably

furnished and equiped, and here pupils are taught the proper care of a house and its furnishing, including simple laundry work.

The Home-makers Course includes not only cookery but also a careful study of marketing and purchasing household supplies in general and the planning and serving of meals. The nourishing value of different foods for people of different ages and occupations, and for invalids, is studied. Careful attention is given to the cost of all articles of food. Economical household management is said to be an important feature of the home-makers course.

The school has a vocational assistant who makes a careful study of the work of each girl during the first year, and gives advice with regard to the industrial course she should select for the following years. This Vocational Assistant confers also with parents, assists pupils to secure suitable employment, and keeps in touch with them until they are finally settled in their occipations.

During the first year all pupils are required to take cookery, housewifery and sewing. During the three following years, they may select as their special industrial subject domestic science, or dressmaking, or millinery. The particular subject chosen receives, of course, the greatest amount of attention, but some time is devoted to the two other subjects as well.

During the fourth year of the course, pupils who purpose to enter the trade of dressmaking or millinery, in addition to the instruction given in these subjects in the school, are also allowed to gain practical experience by actual work in such establishments. They also study the nature and value of different fabrics, learn to test their durability, and learn the purposes for which they are best adapted. These courses give careful, practical training to each student, and have proved to be of money-earning value.

Drawing and color are studied in their relation to dressmaking, millinery and home decoration. Gowns and hats are designed, made and trimmed. The school spends much time in its drawing courses in developing taste in color harmony and proportion.

The other academic studies of the school are somewhat similar to those taught in general high schools, but the principles learned in these subjects are applied to the problems of everyday life in the home. For example, in physics, house-heating, plumbing, lighting and ventilation are thoroughly studied. In the study of history, special attention is given to the development of the arts and industries, and the pupils are acquainted with the great characters in history, the daily life of the people and the main lines along which the world has progressed, and

so forth.

In the study of English, the works of the best authors are read in such a manner as to turn the minds of the pupils in the direction of good literature and to develop a love for it. No attempt is made to fit girls for college, but constant effort is put forth to prepare them fully for the work which they have chosen to do.

The course is four years in length, two-thirds of the time being devoted to academic subjects and drawing, and one-third to industrial work. The course of study is as follows:

Program of Studies.

First year

| Required | Periods | Elective | Periods |
|---|---|---|---|
| English | 5 | No elective work | |
| History | 3 | | |
| Mathematics; Applied Arithmetic, Algebra | 4 | | |
| Art | 4 | | |
| Sewing | 6 | | |
| Cookery and housewifery | 4 | | |
| Choral practice | 1 | | |
| Physical training | 2 | | |
| | 29 | | |

Second year

| | | | |
|---|---|---|---|
| English | 4 | Dressmaking course or Millinery course or Household science course | 10 |
| History | 2 | | |
| Mathematics; Plane Geomtry | 2 | | |
| Chemistry | 4 | | |
| Art | 5 | | |
| Choral Practice | 1 | | |
| Physical training | 2 | | |
| | 20 | | |

| Third year | | | |
|---|---|---|---|
| English | 4 | Dressmaking Course or Millinery Course or Household Science Course.. | 10 |
| History, Civil Government | 4 | | |
| Physics | 4 | | |
| Art | 5 | | |
| Choral practice | 1 | | |
| Physical training | 2 | | |
| | 20 | | |

| Fourth year | | | |
|---|---|---|---|
| English | 5 | Dressmaking Course or Millinery Course or Household Science Course.. | 10 |
| Household accounts, one-half year | 2 | | |
| Home Nursing, one-half year | 2 | | |
| Economics | 3 | | |
| Biology and Sanitation | 5 | | |
| Art | 1 | | |
| Choral Practice | 2 | | |
| Physical Training | 20 | | |

## Part V.

### Prevocational Schools.

In a special report of 1913 made by the Massachusetts Board of Education, it was estimated that there were in this State, beside the 40,000 young people aged 14 to 17 years who were regularly employed, 35,000 boys and girls of that age "who are not in school and who are employed either intermittently or not at all." (p.27) That is to say, approximately 35,000 or 46 per cent of the boys and girls of the State who had left school were "neither at work or in school". (p.31)

There might be many reasons why such a great number of these young people were not in school or at work, but it is obvious that the public education has to do something to meet the needs of these young people.

To answer these needs, the State has already developed several types of vocational schools throughout the State, including continuation schools for the young people who have left school before they are sixteen years of age, and are employed in certain wage-earning occupations. Also certain cities of the State have provided prevocational school for the children who otherwise leave the school as soon as they become fourteen years of age.

As continuation schools have already been treated under the heading of State-aided Industrial Schools, in

this chapter we shall take up the prevocational schools.

Definition: Prevocational,schools, the Committee on Industrial Education of the American Federation of Labor defines as "schools operated primarily to give boys and girls between the age of twelve and fourteen, during part of each day, some intensive work in manual training, in an effort to discover their natural bent for vocational education." (60, p.10)

Mr. Leavitt, in his Examples of Industrial Education, says,"These new courses of study (prevocational courses) are not intended to deprive boys and girls of further education in the higher school, but they aim to save for this education a much larger percentage of the school population while at the same time giving information about, and practice in, some industrial work."(36)

The first experiment in industrial training with the elementary school which started in Boston, is believed to have been the first of this type in the country, as the Agassiz School,Industrial Class was organized in September, 1907. Before this in 1904-1905 and 1905-1906 an experimental modification of the course was made in the Winthrop School, Boston. But the teacher was paid from private sources.(69)

Other experiments in the field of prevocational classes outside of Boston are to be found in Cleveland, Ohio; Newark, New Jersey; Indianapolis, Indiana; St. Paul, Minnes-

ota; Los Angeles, California; Seattle, Washington; Springfield and Evanston, Illinois; and Fitchburg, Massachusetts.

All of these schools differ materially in several particulars, but they agree in the essential fundamentals. The purpose of this paper is confined to the consideration of Massachusetts and the experiments in many schools in Boston; these, it seems to me, are wide enough to give much important information about this type of school. We will consider the prevocational schools of Boston, first and then give a brief sketch of the Practical Arts School of Fitchburg, Massachusetts.

Prevocational Schools of Boston.

According to the Superintendent's report there were 12,412 over-aged pupils, in five upper elementary grades, in June, 1913. It was found that a large proportion of these over-aged children are neither defective, nor less capable than ordinary children. They are simply different. There are some children who are bookish, (scholastic, studious), and inclined to sedentary habits; such children get along very well in the ordinary school curriculum. But a large number are so much different in temperament and belong to the so-called "motor" rather than the intellectual type. These children learn best by doing things. When things are presented to them objectively, and they see the practical value of knowledge, they are awakened, and make

rapid progress.

It is generally accepted that the efficient training of these "practical- or concrete-minded" children must be accompanied by action, by practical doing arousing their interest, while at the same time stimulating their mental ability. It is said that when these children are properly trained they will exeell in industrial and business careers, but they too often drop out of school as soon as they become fourteen years of age, and in most cases they leave school not so much because of financial need, but because of their distaste for the ordinary school studies.

From a study of the age and schooling certificates issued by the office of the Superintendent during the school year 1912-1913, it was found that of the children between fourteen and sixteen years of age who entered permanent employment in the shops and factories, eighteen per cent were from the seventh grades; 13 per cent from the sixth grades; 5 1/2 from the fifth grades; and 3 percent from the fourth grades of the Boston elementary schools. That is to say, 40 per cent of the children who went to work left before reaching the eighth grade of the elementary schools and every one of these children should be classified as over-age.

These facts were recognized several years ago and with these groups of boys in mind, the School Committee of Bos-

ton has already established prevocational classes in different parts of the city, where various kinds of handicrafts are conducted in connection with the study of arithmetic, spelling, reading and writing.

The primary purpose in establishing the classes was to provide an experiment, the results of which would assist in answering one or all of the following questions:

(1) Is it possible so to modify the elementary school curriculum that it will become more effective in training pupils for industrial pursuits, while maintaining the same efficiency in preparation for the high school?

(2) Will a considerable number of boys and their parents be interested in such a course of study, should it be established?

(3) If taken by boys otherwise likely to leave school at fourteen years of age, will this course have the effect of inducing them to stay longer in school?

(4) Will the pupils be as interested in manufacturing a product which is to be used by the city as in making for themselves the ordinary manual-training models?

To obtain some practical experience relating to these questions, the school committee on May 6, 1907, passed the following order:

"That the superintendent be authorized to designate one or more boys' elementary schools in which the course of study may be experimentally modified for the purpose of

determining in what way these schools may become more effective in training pupils for industrial pursuits, while at the same time maintaining their efficiency in preparation for high schools."

In accordance therewith the superintendent selected the Agassiz School, Jamaica Plain.

About a week before the close of the school, copies of the following circular were distributed among the boys who were to be in grade 6 during the coming year:

Agassiz School, Jamaica Plain,
Mass., June, 1907.

An opportunity will be offered, next September, to fifty boys of grade 6 in the Agassiz district, to enter a class in which the course of study is planned especially for boys who have an aptitude for industrial pursuits.

The course will offer more manual training, shop arithmetic, and working drawing, and at the same time will maintain the efficiency of preparation for high schools.

If you wish your boy to join this class, please sign the following blank form and return it to the master of the school.

As the number who can be accomodated in this course is limited, the earliest applications will be considered first.

Nearly one-third of all the boys eligible for the class applied within one week, and in the following September a sixth-grade class of fifty boys was organized. While these boys selected the course because they were industrially inclined, 38 stayed to graduate. Of these 24 entered high school, 6 went into mechanical work, 2 into clerical work, and the vocations of the remaining 6 are unknown.

Of the 24 who entered high school, 10 went to the

Mechanic Arts High School, 3 to the English High School, 2 to the Latin School, 2 to the Commercial High School, and 7 to the general local high school.

The standing of the boys in the first year academic work of the high school was reported as follows: 7 ranked as poor, 11 as fair, 4 as good, and 2 as very good.

The above facts and figures would seem to indicate that the primary purpose of establishing the prevocational class had been achieved. The result of this experiment in Agassiz Schhol has made the school committee of Boston engage actively to establish several prevocational classes in different districts of the city. In 1911, there were 6 prevocational schools, and their practical value has been experimented and reported as follows:

"A large number of pupils who were about to leave sch school have been awakened to new interest in their studies through these prevocational classes and ending their school days has been postponed."(1913 school report.)

Recently, the school committee, recognizing more clearly the need and value of such schools, has opened an additional six-room center in Mather District, Dorchester, in September,1913. In this center, three shops are provided for wood, electrical and sheet metal working. Three classrooms parallel the shops. Boys are admitted from any district of the city, who are over-age and of the motor type.

At present, there are seven schools of this kind in

Boston, and they differ from one another as to the kind of pupils chosen as well as in the nature of the work; in some the children who are selected are not at all backward in their ordinary school work; in some but little attention is paid to the relation of the shop work to the course of study in other subjects. The districts and departments of the existing classes in Boston are as follows:

Agassiz School---Box making and wood work,
Brewer and Burroughs Streets, Jamaica Plain.

Lewis School---Printing,
Paulding Street, Roxbury.

Oliver Wendell Holmes School---Furniture making,
School and Athelwold Streets, Dorchester.

Quincy School---Machine shop practice,
Tyler Street, near Harvard Street, Boston.

Sherwin School---Sheet metal work,
Sterling Street, Roxbury.

U.S.Grant School---Book binding,
Paris Street, East Boston.

Mather School---Wood, electrical and sheet metal,
Meeting House Hill, Dorchester.

The aim of these classes differs, but may be summed up as follows: (1) to put into operation in the elementary schools an influence which may prolong school life after they have reached the age of fourteen years, (2) to awaken in certain boys a desire for an industrial career and to offer definite opportunity for vocational guidance therein; (3) to enable them to graduate earlier than they

would under present circumstances; (4) to point to the Boston Industrial School or the Mechanic Arts High School after graduation from the elementary school, rather than to the street or some blind alley vocation; and (5) to afford some definite preparation for boys who actually go to work at fourteen years of age.

The admission to these classes is boys 12 to 14 years of age of each school or of adjoining districts who select the work with the approval of masters, parents, or guardians.

The school hours are regular elementary school hours of 25 hours, of these 10 hours a week for industrial work. The school year begins the first week in September, and closes the last week in June,(40 weeks). The length of the course is two years or less.

The classes in these prevocational schools are usually small, and the academic work is restricted to reading, spoken and written English, arithmetic, drawing, geography, history and hygiene; each of these subjects is closely connected with the shop work. The shop work itself occupies almost one-half of the school day, and concerns itself with the production, under shop conditions of commercial products. The instructor s of these shops are practical people. Time cards and job tickets are kept, and attention is given to the ability to economize time and material.

Frequent visits are to be made to factories, shops and mills and to industrial exhibitions.

The following example of the work done in the Quincy Prevocational class might show the exact idea of this type of schools, and also what can be done with the over-aged children in the upper grades.

Quincy School.

The class in iron work was organized in September, 1909. Forty-four boys were selected from the fifth, sixth, and seventh grades. They were selected for these reasons: They were fourteen years of age or would be during the year, they had shown particular ability in manual work, and their conduct and interest in school were unsatisfactory.

The purpose was, as of the other industrial classes in Boston elementary schools, to offer an inducement to pupils to remain in the school after they have become fourteen years of age, and to arouse an interest in the importance of industrial work.

In this class the regular program was altered to provide ten hours a week of shop work, and three periods a week of mechanical drawing. While one-half the class was in the class-room, it was arranged that the other half should be in the shop, each under efficient instructors, (one of the teachers was of mature experience and the other a machinist by trade, and previously a manual training instructor)

A comparison of the regular and modified programs is as follows:

| | Regular | Modified (Minutes) |
|---|---|---|
| Manual training | 120 | 600 |
| Drawing | 90 | 135 |
| Arithmetic | 230 | 220 |
| Elementary science | 45 | |
| Geography | 150 | 60 |
| History | 120 | 60 |
| Music | 60 | 30 |
| Opening exercises | 30 | 25 |
| Physical training | 80 | |
| Recesses | 100 | 75 |
| Reading and literature | 165 | 45 |
| Physiology | 30 | |
| English--spoken and written | 280 | 250 |
| | 1500 | 1500 (25 hours) |

The loss of time for the regular work is largely compensated by the greater amount of individual instruction, as the class is small compared with a class of forty-five.

Much of the work done in the shop consists of repair work. The management of the school believes that nothing develops ingenuity and initiative more than planning and struggling with the difficulties offered by the various articles to be repaired. The matter of simply finding work to do has become a question of selecting work which will serve best to develop common sense and skill, and to connect the academic work with the mechanical.

Mr. Frederick W.Swan, the principal of this school reports that (1913) in this work what are often called dull boys prove to be bright and earnest in attacking problems

which were formerly given without practical relation to actual life. No boys could show greater interest in any kind of work or play than do the boys of the industrial class. There is close relation between the shop practice and the academic work, and this is more so in arithmetic, spelling, geography and reading. It is believed that this correlation makes it possible to give the full amount of time called for in written language, spelling, arithmetic, and so forth.

Most of the boys in this class are regularly promoted and many retarded boys catch up with their former classmates. This class in one way corresponds to the ungraded class, but it differs in one respect, that every effort that is possible, is done to keep the boys in school. For example, the part-time plan is adopted when it was found that certain boys must leave the school, for financial reasons. By this plan, two boys alternate with each other in shop and school. Thus each boy is aided in every way to remain in school until everything has been done to prepare him to enter the more skilled, intelligent, and responsible labor.

Mr. Swan, in his report says (69):

"The prevocational class acts as a factor in holding a boy in school after fourteen, at least until he is skilled enough to compete successfully with older unskilled

workers."

In this class, the machine shop practice is not given with the intention of making machinists. This may be shown by the fact that those who go to work do not necessarily seek industrial employment. Out of the class of 1910-1911, twenty-three are at work, out of this number but half are in industrial shops.

The total number of boys who have been assigned to this class is 169. Of this number, 7 removed to other districts, 43 left to go to work, 58 were graduated, 57 are now in school; 80 reached the eighth grade and 20 of those who graduated are now in high school.(1913).

Summing up the experiment of the industrial class in Agassiz School Mr. Swan says, as follows:

"It may be said that the prevocational class has proved a solution of the problem of the boy whose conduct is unsatisfactory, of the problem of retaining boys at fourteen, of shortening the grammar school course, of retaining retarded pupils, of giving the mechanically inclined boy a chance, a great help in reaching the boy whom the regular course of study has failed to develop."

Prevocational Schools for Girls of Boston.

There are nine of the elementary schools in Boston, in which the standard course of study has been modified to meet the needs of certain selected girls. Each of these

schools has one or more classes of girls following some particular form of training aimed to be of both practical and geheral benefit to the pupils taking it.

The girls selected are those whose aptitudes are more evident in manual than in academic lines, and they are generally girls who would not remain in school long enough to graduate from the regular grade class.

The work planned is different andeach school is working out its own problem under its own needs and limitations. In several districts the emphasis is made more upon the homemaking or housekeeping, and in the other schools the attention is given more to the sewing.

The general aim may be said to be the following:(1)to keep girls in the schools after their fourteen years of age, by increasing their work-interest and to help them determine more intelligently their future occupation;(2)to re-establish the necessary balance between academic and practical work in the school; (3) to restore to the pupil opportunities for applying the theories of the book which modern city life has largely removed from the home.

The instruction in these classes is most practical and every academic study in the regular course has close relation to its field of application. To take an example, the problems in mathematics have been based on measurements

actually worked out by girls, on the cost of material of their new dress, used in the making. In geography, an illustration may be made by Indian corn, wherein the pupils study its history, its production, transportation, and marketing, and its particular use as a food. Thus, in the study of physics, the water and drainage system of the "House", of the air currents in the stove and furnace, and many other such problems are given to arouse their interest showing them a practical value that mere theoretical study does not afford.

Nine of the schools are as follows: Abraham Lincoln; Bowdoin; Dillaway; Franklin; Hancock; Norcross; U.S.Grant; Washington Alston; and Wells.

The admission to these classes is to girls twelve to fourteen years of age of each school who select the work with the approval of the master, parents or guardians.

The school hours are regular elementary school hours of 25, and of these 10 hours for industrial work.

The following is an example of one of these classes where the vocational purpose is more emphasized than others.

Hancock District.

The industrial class in the Hancock District has been carried on in the North Bennet Street Industrial School, a private institution. The course of study to be followed is

determined by the Board of Superintendents and the work is over-seen by the public school supervisors, although the actual instruction is given by the North Bennet Street School teachers.

The work was first undertaken with the girls, a class of fifty from the Hancock District being assigned to the industrial school in September, 1907, for 10 hours of industrial training per week. This school has also prevocational training for boys.

The girls are selected for the class on approaching their fourteenth year and most of them are expected to leave school as soon as the law allows them to. Selection is made from the sixth and seventh grades by the master of Hancock District in conference with a committee from the Board of Superintendents.

The girls of the prevocational class remain at the industrial school all day. That is, all their work is given them by the industrial school in order that the experiment may be carried on in its entirety.

"The aim of the school is to prepare the girls to earn a livelihood at some skilled work for a few years prior to their marriage, to raise the standard of their present home influences, and to teach them the ways in which they nay later establish homes for themselves. It

also aims to possess them of some means of support in case of widowhood or other misfortune after marriage, and in view of the fact that a large percentage marry, opportunities are provided for training in home management."(Catalog of North Bennet Industrial School, 1914.)

In this class all academic work is presented in terms of its industrial application. For example, fractions become important to the girl who is working out the cost of her products.

Geography likewise takes on a new meaning. It is not a thing of maps or definitions. Through it the pupils discover where the materials with which they are working are found or made, how they are prepared for market, and thru this method they naturally learn for what harbors and rivers are used and how great cities come to be, while the laws regulating manufacture, export and import assume absorbing proportions.

Connected with this school is The Paul Revere Lunchroom, where the girls receive practical household arts training by its daily operation. In this class girls divided into groups of six, each division to take the luncheon in turn. The girls decide on the menu, buy and prepare the food, serve the luncheon from twelve to one o'clock to between twenty-five and thirty people, change their dresses and are ready for the classroom at half past one,

the dished being washed by a group of junior girls. In the afternoon they compute the cost of the luncheon. This is an arithmetic lesson with a point to it. The figures upon which they are working are no paper affair. They have been through the processes from the butcher and the grocer, they know.

The same thing is to be observed in the sewing room. Order work is given by friends of the school often times. The work on these articles makes the girls awake to the more practical money value of their products. The management of the school believes, that while financial profit is little emphasized at the school, the work should never be done at a loss, for the training in business method is one of the most educational features of this experiment.

The school hours of this class are usually 25 per week. The school year is 40 weeks. The length of the course is two years or shorter. The age of the girls admitted is from thirteen to fifteen.

The school is located at the North end of Boston, the immigration district where densely populated with people from other lands. It will be interesting to notice that the total number of girls belonging to this class at present is 44, (1913-1914) of these 40 are Italian; 2, Swedish; and 2, Jewish.

Practical Arts School of Fitchburg.

This school has been established by the State to furnish opportunity for observation and practice to the students at the Fitchburg Normal School. Pupils from any part of Fitchburg who have completed the sixth grade are admitted. Four courses offered are as follows:

A commercial course for those who expect to take the commercial course in the high school or business college, or who intend to go to work in offices or stores at the end of the grammar grades.

A literary course for those who expect to go on through the high school and college.

A manual arts course for those who expect to take the industrial course in the high school, or who intend to go to work in the trades, the mills, or the factories at the end of the grammar grades.

A household arts course for girls who wish to devote a large amount of time to the arts of homemaking.

The successful completion of any one of the courses admits the pupil to any course in the high school, for example, he may continue the line of work he started or may take a new start by electing a different course in the high school.

The school hours are 30 hours per week. Of these, 20 hours are required for common subjects to all pupils, and

10 hours for elective subjects.

The program of studies is as follows:

Common Required Subjects,

Literature, Composition, Spelling, Penmanship, Mathematics, Geography, History and Science.....12 1/2hours. Physical training, Music, General Exercises, and Recesses .....7 1/2 hours.

Elective Subjects,

Commercial course,

Bookkeeping, Business forms and procedure, Business arithmetic, and Related Design.....5 hours.

Typewriting and handwork.....5 hours.

Literary course,

A Modern language.....5 hours.

Drawing, Designing, Making, and Repairing (Household arts for girls).....5 hours.

Manual arts course,

Drawing, Designing, Making, and Repairing....10 hours.

Household arts course,

Household arts.....10 hours.

The instruction in these courses extracted is as follows:

An unusual amount of time is given to handwork, which takes the form chiefly of typewriting in the commercial course, and which in the other courses is devoted

to a great variety of useful and necessary labor. No work is undertaken except in response to a real need. The finished work must meet the need adequately, and must be performed with dispatch and in a workmanlike manner. Pupils are therefore directed not only by teachers but also by skilled journeymen, who work with them. Beauty of design, color, and ornament are not neglected.

The school carries into effect the very latest and best ideas of grammar-school instruction by means of differentiated courses, with complete equipment and adequate teaching force.

## Part VI.

### Private and Endowed Industrial Schools.

The schools included under this classification are private industrial schools besides those of State-aided and public schools. Among such schools are the following in Boston: Wentworth Institute; Franklin Union; Lowell Institute for Industrial Foremen; North End Union; Women's Educational and Industrial Union; Febrew Industrial School; North Bennet Street Industrial School; Boston Architectural Club; Massachusetts Charitable and Mechanics Association; McDowell Dressmaking and Millinery School; Miss Farmer's School of Cookery; Wells' Memorial Institute; State Steam Engineering School; Hawley School of Engineering; The Automobile, Co-operative Engineering, Polytechnic, and Electric Schools of the Y.M.C.A.; Boston Christian Union; New England Linotype School; Paul Revere Pottery; Massachusetts College of Telegraphy; Chickering and Sons Piano Tuning School; Faust School of Pianoforte and Organ Tuning. In addition to these are such other schools in the State as the apprenticeship school of the General Electric Company at West Lynn; the apprenticeship school of the Fore River Shipbuilding Corporation at Quincy; the industrial school of the Ludlow Associates at Ludlow; and the evening schools and part-time schools of the Y.M.C.A., scattered throughout the State.

The work planned by these schools above mentioned differ from ome another, but most of them are doing excellent work. According to the types and grades these schools may be classified briefly as follows:

1. Intermediate Industrial or Preparatory Trade School
2. Trade Schools.
3. Part-time Schools.
4. Continuation Schools.
5. Co-operative Schools.
6. Technical and Practical Shop Courses in Evening Schools.
7. Technical Schools.
8. Apprenticeship Schools.

Most of these several types of schools have been treated previously on the chapters in Public Schools. We shall take up the last two--Technical Schools and Apprenticeship Schools.

Technical Schools.

These schools are designed "to give the pupil such informations with the scientific and mathematical principles underlying commercial processes as will enable him to qualify in time for the work of foreman, master mechanic, inspector, etc."(47) The following is one of the best schools of this type:

Wentworth Institute.

The Wentworth Institute was founded by Mr. Arioch Wentworth in 1904, abd was opened for instruction in September, 1911. The school is housed in its own buildings which were completed in May, 1914, located on the south side of Huntington Avenue, Boston.

The site owned by the Wentworth Institute contains over twelve acres. The buildings include the Foundry of the Institute, about 50 feet square; the main Shop Building, 145 feet long by 49 feet wide, with four high posted stories and a wellolighted attic floor, for other workshops, the drawing-rooms, laboratories, and class-rooms; a small wing for offices; and the Steam Power Plant Laboratory, about 80 feet square. All these shops and laboratories are thoroughly equiped with the best modern tools, machinery and apparatus, which have been specially designed to meet the special needs of the students of the school.

The purpose of the school is to give young men training for mechanical trades and to "increase the average standard of skill and intelligence in all of the trades for which it establishes a course." The instruction is designed to cultivate mechanical skill and to give a thorough knowledge of technical and scientific principles that underlie it. The training is "sufficiently broad to

develop habit of reasoning, power of initiation, and ambition." (Catalogue of the Wentworth Institute, 1914-1915, p.1 and 2.)

The school offers courses both day and evening, and these are divided as follows:

One-year Day Courses; Two-year Day Courses; Evening Shop Courses; and Evening Technical Courses.

Students admitted to this school should be mature, at least sixteen years of age or over and thoroughly in earnest. For the one-year day courses and for the evening courses, no entrance examinations are required, but the applicants must satisfy the Principal that they are fitted by natural ability, practical experience, or previous school training to succeed in the type of work which they wish to undertake. Applicants for the two-year day courses are required, in addition to satisfying the Principal of their fitness, to pass examinations in arithmetic and English. In arithmetic, he must show facility in common practical use of calculation; in English, he must be able to express himself intelligently in matters relative to his proposed trade.

To exclude applicants not earnestly intending to devote themselves to the learning of definite trades, each pupil is expected to pay a tuition fee. In day courses,

$6.00 per term (3 terms a year); also a laboratory charge of $3.00 per term for one-year courses, and $5.00 per term for two-year courses are required. In evening courses, the tuition is $6.00 per season (2 terms); also for the evening classes in Machine Work, Electric Wiring and Plumbing, there is a laboratory charge of $6.00 per season.

The hours of instruction in this school for different courses are as follows:

Day courses: 8 to 12 and 1 to 5 except Saturdays, that is, 5 days a week, having 8 hours a day, September to June.

Evening courses: meet three evenings a week, 7:30 to 9:30, that is 6 hours a week, September to March.

The following is a brief description of these several courses:

1. The day courses are of two types; (a) condensed one-year courses for beginners, and (b)more thorough two-year courses for young men who have some practical experience, and who wish to become superior workmen, master mechanics, or foremen.

In the day courses, the plan of instruction requires the student in each course to spend half a day, five times a week (that is, 20 hours a week) in an appropriate shop, acquiring skill and practical experience in his chosen trade. The other half-day is spent in the laboratory,

drawing-room or class-room getting the technical and theoretical instruction that is essential to his trade. This instruction includes lectures on shop methods, applied science and practical technology related to the particular course, testing and laboratory practice, drawing and designing, estimating and practical computations. Each day in the shop the student is expected to apply the principles which he learned the previous half-day in the class-room, drawing-room or laboratory.

(a) One-year day courses.

The courses are intended for beginners and persons who have had little practical experience in the mechanical trade and wish to become skilled and intelligent mechanics. It is said that one year of work in a trade school is not sufficient to become a competent journeyman, but there is no doubt that it greatly shortens the period of training. It was found by experience that a year of practical instruction in a trade school is equivalent totwo years and in many cases three years in a shop. The management of the school believes that enough practical skill and immediate earning power will be gained in these one-year courses to make ample return for the sacrifice of time, money and effort. The school hopes that in these courses the students will"acquire standards of accurate workmanship, habits of reasoning and of seeking for best methods, and an increas-

ed ambition that follow them, long after they leave the Institution." (Catalogue of the Institute, 1914-1915,p.13)

The one-year courses offer instruction in the following trades:

In Manufacturing Trades,

Machine Work; Patternmaking; and Foundry Practice.

In Building Trades,

Carpentry and Building; Electric-Wiring; and Plumbing.

For example, in the Machine Work Course, this course is intended for young men who wish to become intelligent and highly-skilled machinists. It is planned to furnish, in a shorter time and more efficient way, the training that the old-time system of apprenticeship formerly offered, and to give greater likelihood of promotion to the highest grades of work. In this course the student is given a thorough knowledge of and experience in all the fundamental operations of the principal tools in a wide variety of high grade machine work. Parallel with the instruction in the shop, where the most scientific and most advanced methods are taught, there is a sufficient amount of theoretical instruction in shop calculation and in the principles of applied science underlying the machine trades, in class-room, drawing-room, and laboratories of the school, to cultivate the student's reasoning power and resourcefulness.

The subjects taught in the Machine Work Courseare: Shop Practice in Machine-tool Work, (Machine Construction, Bench-work and Tool-making, Principles and Practice of Forging, Tempering steel, Foundry Practice and Pattern-Making), 20 hours per week; Mechanical Drafting and Blue Print Reading, 6 hours; Practical Mechanics, Materials of Construction, and Power Transmission, etc. (recitations and laboratory practice), 9 hours; and Practical Mathematics, Machine Shop Computations, 5 hours. Total, 40 hours per week.

(b) Two-year Day Courses.

These courses are more thorough courses and are intended for thode who already have had some practiaal experience or training in the mechanical trades, and wish to become superior workmen, master mechanics or foremen.

The management of the school believes that the "greater length makes it possible to offer more shop experience in the chosen specialities, and to supplement it by instruction in the related trades, thus developing greater resourcefulness and a broader comprehension of trade and manufacturing methods. There is also sufficient time to teach the underlying principles of applied science in a much more complete way than is possible in a one-year course." (Catalogue of the Institute, p.51.)

Two-year courses offer instruction in the following

trades.

Machine construction and Tool Design.

Electrical Construction and Operation.

Foundry Management and Operation.

Architectural Construction.

For example, In the Machine Construction and Tool Design Course, this course gives a thorough training in the practical methods of manufacturing and in those branches of applied science which underlie modern machine shop practice and tool design. It is intended to train young men for the higher grades of work in such industries as the manufacture of machine tools, steam and gas engines, steam pumps, automobiles, shoe machinery, cotton machinery, tools and builders' hardware, and the manufacture of a large number of similar articles, made from iron, steel and brass. The course is broad as well as practical, and is intended to encourage the student to think and to act for himself, and to make himself self-reliant and resourceful.

The subjects taught in this course are as follows:

First year: Practical Mechanics; Electric Motor and Appliance and their principles; (recitation and laboratory practice), 15 hours per week; Mechanical Drafting, Shop Drawing and Machine Details, 8 hours per week; Practical Mathematics, 5 hours; Shop Practice, Molding and Foundry Work, Pattern-making, and Forging, 12 hours per week.

Second Year: Applied Mechanics, 5 hours; Applied Electricity, 4 hours; Steam and Electrical Power Plant Practice (Laboratory work), 10 hours; Machine Sketching and Tool and Jig Design, 8 hours; Advanced Practical Mathematics, 3 hours; Advanced Shop Practice, 10 hours.

For example, instruction in Practical Mechanics, this is given both by recitation and in the laboratory, and includes those principles of practical mechanics a thorough knowledge of which are essential to the superior workman and highly skilled mechanic or workman,or foreman, such as the study of the lever, the equilibrium of forces, the transmission of power, inertia, and the influence of the fly-wheel, the effects of shock, and the principles of compressed air, heat, etc.

Also in Practical Mathematics, the instruction is intended to enable the student to perform with accuracy and confidence such calculation as he will be likely to meet in practical work after completing his course. The instruction includes practical arithmetic, the use of simple formulas, elementary algebra and geometry.

In these day courses, the number of teachers giving instruction at present is 31, and the number of students enrolled is 410. The average age of the students is 21. (March, 1915.)

2. Evening Courses.

The courses are similar in character to the Day courses so far as time permits. They are especially intended for young men already employed in trades or mechanical industries during the day and are planned to increase efficiency and aid promotion.

The instruction in these courses is adapted to the individual needs of the students, and is planned to supplement the experience that they are getting in their regular work during the day. It also furnishes opportunity to obtain practice on higher grades of work.

In every course the practical instruction in shop and laboratory is accompanied by practical talks and lectures upon the best methods and materials for various kinds of work. All of the equipment provided for the use of the day students is available for the students in the evening classes, in addition to the special facilities that are planned for their particular use.

The evening courses are divided into two departments, that is, (a) Evening Shop Courses and (b) Evening Technical or Applied Science Courses.

(a) The Evening Shop Courses offer for instruction the following trades:

Carpentry and Building
Pattern-making
Forging and Tempering
Foundry Practice

Advanced Pattern-making
Machine Work
Advanced Machine Work
Tool-making
Electric-wiring
Plumbing
Advanced Plumbing

These courses are designed for three classes of men; first, beginners; second, those who are at present helpers or apprentices, and who wish to advance rapidly to the rack of skilled journeymen; and third, journeymen who wish to become foremen.

For example, in a course in Carpentry and Building, this course includes carefully planned work in bench-work and joinery, details of house-framing and finishing, cabinet-work, the operation of woodworking machinery, instruction in methods of laying out work from plans, practice in reading and interpreting architects' scale drawings, and estimating and making bills of materials. Practical talks on the best methods of work and on the principles of wood construction are given at frequent intervals throughout the course.

(b) Evening Technical Courses; at present the following 12 trades are offered in evening technical and applied science courses:

Practical Mathematics
Mechanical Drawing
Machine Design
Architectural Drawing
Architectural Design
Practical Mechanics

Architectural Construction

Strength and Properties of Materials

Reinforced Concrete and Fireproofing

The Steam Engine and the Operation of Power Plants

Applied Electricity

Electrical Machinery--Direct Current and Alternate Current.

For example, in Applied Electricity Courses, this course is intended both for beginners and for young men already employed in electrical occupations. The purpose is to give a clear understanding of the theoretical principles that underlie practical work. Instruction is given by lectures and class-room instruction, supplemented by laboratory practice, in which principles are made clear to the student by experiments which he performs himself. In the laboratory, emphasis is laid upon the actual operating and testing of the different types of apparatus.

In these evening courses, the number of teachers giving instruction at present is 40, and the number of students enrolled is 783. The average age of the students is about 25. (March, 1915.)

## Part VII.

### Apprenticeship Schools.

In a Report on Industrial Education, published in 1910, by the American Federation of Labor, we find the following statements:

"It is of more than passing interest to note that the revival of apprenticeships by large corpolate interests through comprehensive and sane regulations is gradually taking form. With the growing feeling that the old-time apprenticeship system must be modified to meet modern conditions of life, there looms up the question of a substitute which shall keep the best and most necessary of the older customs, and meet modern requirements. It is further recognized that the old apprenticeship system possessed many features that were unecomomic and unjust, but with the preservation of much that was good and its application by proper blending with the modern idea of perfection in theory, it would lead to more satisfactory results."

It may be said that this revival of apprenticeship has developed along four lines of training, namely:(39)

1st, where the industrial establishment and the school system co-operate in the education of the apprentice, practice in the shop being supplemented by related school study of mathematics, drawing, physics, chemistry, etc.

2nd, where the employer provides such school exercises within his own establishment.

3rd, where the industrial establishment recommends or requires school study without making any provision for such supplementary training.

4th, where the apprenticeship training is practically concentrated upon a single process or group of processes for the purpose of securing specialized skill.

In this sense, the co-operative schools and some other types of vocational schools of the State may be regarded as certain types of apprenticeship schools, but in this chapter, we will consider only apprenticeship schools of the above mentioned second type, that is, those schools conducted by employing establishments for the training of their apprentices by indenturing them for a period of years, with the sole object of giving them complete, practical training, as well as instruction in the related academic subjects, such as drawing, mathematics, etc., which are necessary for advancement in their respective trades.

According to a Report on Industrial Education, published in 1912, by the American Federation of Labor, (60, p. 57-58), the term of indenture in most of these apprenticeship schools is for four years, and the boys are required to attend school a specified number of hours dur-

ing certain days of each week throughout the period of indenture. At the completion of the apprenticeship term, the boys are generally given their tools and a bonus varying from $50 to $150. The rate of pay is gradually becoming standardized in each shop according to the trade and is usually increased each six months.

In a graat number of railroad schools, as well as in other employing establishments, school is in session five or six days of the week, but ordinarily each boy attends only two days. (It is said that this arrangement is made to prevent serious interference with shop organization resulting from the taking off of a large number of boys from a given department at the same time.)

In most schools few text-books are used and the instruction is given mainly from lesson sheets prepared by the instructors in the several trades; the instruction is closely related with the work in the shops performed by the boys when at gainful occupations. The school instructor is usually a man who has graduated from the working force, having been selected because of his thorough knowledge and familiarity with the trade, as well as for his keen insight into modern methods applicable to the trade.

For the most part, these schools are situated at the employer's works. Attendance is compulsory; the time

spent in school is paid for at the same rate as the working time.

School instruction bears close relation to the shop practice, each and every school subject being taught with that particular aim in mind; thus trade problems are closely correlated with school instruction.

In Massachusetts, there are several schools of the above-mentioned second type. The following schools are the most widely known throughout the country:

1. The Apprentice School of the General Electric Co., Lynn, Massachusetts. This school was established in 1902 with the purpose of producing expert mechanics having a thorough understanding of the theoretical foundations of practice, who will be able in time to qualify for such positions as foreman, superintendent, shop engineer, etc. The school is controlled and supported by the General Electric Company.

An applicant for admission must have a grammar school education or its equivalent and he must be over 16 years of age. The following courses of instruction are offered: (a) for Machinist, Die and Tool Makers; (b) for Pattern Makers; (c) for Moulders; (d) for Blacksmiths; (e) for Stem Fitters; (f) for Draftsmen and Designers; (g) for Electrical Testers; (h) for Technical Clerks; and (i) Spec-

ial Apprenticeship Courses. Practical shop-work is given in training rooms which are especially provided for this purpose, and apprentices receive class-room instruction in the related sciences so as to develop an industrial understanding and intelligence. (The General Electric Co. The Apprenticeship System.1914.)

To quote from Mr. M.W. Alexander, Supervisor of Apprentices of the company:(39)

"The apprentice remains in the training room for a period of about a year and a half to two years,....and during that time is given an opportunity to work with the different machines and tools and to perform different operations on a variety of work....The apprentice is transferred from the training room at the end of about two years to different departments of the factory. A school has been established in connection with the apprenticeship course, in which instruction of an eminently practical character is given for the purpose of supplementing and amplifying the practical work of the shop. Each apprentice is obliged to spend six hours a week out of his regular time of employment in the class room, during which time he receives the same wages as if he were working at the bench or at the machine. The teachers in the class room are selected from the staff of engineers, draftsmen and foremen of the company and devote part of their time to teaching. They are chosen in preference to professional educators on account of their intimate knowledge of the needs of the factory and the industries in general. Their work covers instruction in that branch of mathematics, physics, engineering and mechanical drawing which is a necessary part of the equipment of a skilled artisan."

One year's apprenticeship consists of about 2000 hours, (about 7 hours a day's work). The course varies in length as follows:

Machinists' Course.....4 years.

Pattern Makers' Course.....4 years.

Moulders' Course
Iron and Steel Moulders.....2 years.
Brass Moulders.....2 years.
Blacksmiths' Course.....2 years.
Steam Fitters' Course.....2 years.
Draftsmen and Designers' Course.3 years.
Electrical Testers' Course.....3 years.
Technical Clerks' Course.....2 years.
Special course.....2 years.

A graduated apprentice is awarded a cash bonus of fifty to a hundred dollars according to his course, and a Certificate of Apprenticeship, which states the time served in practical training and outlines the theoretical work which he has completed.

2. The Apprenticeship System of the Fore River Shipbuilding Corporation, Quincy, Massachusetts. This was established in 1907 for the purpose of training apprentices in the shipbuilding trades. It is managed and supported by the Fore River Shipbuilding Corporation. Applicants for admission must be not less than 16 years of age, and are not desired if over 18 years of age.

As shipbuilding, marine engineering, and steam turbine building require skill in many arts, apprentices are taken in nineteen trades, such as: Blacksmith, Coppersmith, Plumber, Steam Fitter, Sheet Metal Worker, Electrician, Molder, Shipwright, Patternmaker, Joiner, Machinist, Outside Machinist, Painter, Shipfitter, Mold Ebftsman, Shipper, Caulker, Riveter, Anglesmith, Boilermaker, and Stationary Engineer.

The trades above noted, of which but brief outlines have been given, cover the work necessary for the construction of hulls and machinery of vessels of all types.

Upon entering the school, the first six months are considered as a term of trial. If the applicant for apprenticeship during this term proves satisfactory, he is indentured for some special branch of the trade. Each apprentice is allowed a bonus of one hundred dollars, from which, as soon as the apprenticeship agreement is signed, he is permitted to requisition the Corporation for tools, technical books, drafting equipment, etc., which are charged against his bonus account; the balance is paid the apprentice in cash at the completion of his term of apprenticeship.

The Corporation has a regular school room in one of the buildings in the shipyard. All the first-year apprentices attend class four hours each week, in the morning, and are paid for their time in the schoolroom. Each apprentice is supervised by the foreman in his shop work, and he is instructed regularly in Algebra, Geometry, Mechanics amd Mechanical Drawing.

Apprentices in the trades of machinist, joiner, plumber, coppersmith, sheet metal worker, and mold loftsman, attend the Quincy Industrial School, alternating weekly between shop and school. The week in school is spent in

studying the technical branches of the trade. This is continued for the first three years of apprenticeship, or until such time as the capacity of the apprentice warrants full time in the shop.

Each year of service is to nonsist of 2384 hours of actual service to the Corporation. The full term of apprenticeship for those with no previous experience is four years.

Wages are paid weekly according to the following schedule, based on a week of forty-eight hours:

9 cents per hour for the first year (including trial period.
10 1/4 cents per hour for the second year.
14 1/8 cents per hour for the third year.
16 7/8 cents per hour for the fourth year.

3. The School of Printing of the North End Union, Boston, Massachusetts. This school was established in 1900 under the supervision of several leading master printers of Boston. Since January, 1910, it has been conducted under the auspices of the Boston Typothetae Board of Trade which is composed of the leading employers in printing and allied trades in the city. The aim of the school is "to give apprentices an opportunity to learn and thoroughly understand the fundamental operations of good typographic printing, and to lay the foundations for future intelligent and competent workmanship." (71) The fee for

the printing course is $100 a year, which in many cases is paid by the printer to whom the apprentice is indentured.

Upon entering the school, the first three months are considered as probationary period during which the pupil's qualifications and interest in the work are considered. The first year is devoted exclusively to work in the school before the pupil enters the workshop. The work of the school is practical and the instruction is individual. The total apprenticeship period is five years-- one year in the school and four years in the shop. The course of instruction embraces book, page, job and advertising composition, and platen presswork. Practice in the ordinary kinds of straight composition is followed by tabular and miscellaneous display work. A number of technical pamphlets and two small monthly publications are issued by the school, and these give ample opportunity for practical work.

The school hours are based on the shop schedule, namely 48 hours per week, for 12 months.

No wages are paid for the time spent in the school, but when a pupil has successfully completed the years school work, he is placed as an apprentice in some printing establishment at a salary of seven dollars a week, and each six months thereafter, upon fulfilling the terms of his agreement, he is to receive an increase in wages

as shown in the following table: (From a pamphlet issued by the School of Printing, 1915.)

| | | |
|---|---|---|
| First year (in school)..... | | No income. |
| Second year | (26 weeks at $7..... | $182.) |
| | (26 weeks at 8..... | 208.) |
| Third year | (26 weeks at 9..... | 234. |
| | (26 weeks at 10..... | 260.) |
| Fourth year | (26 weeks at 11..... | 286. |
| | (26 weeks at 12..... | 312.) |
| Fifth year | (26 weeks at 13..... | 364. |
| | (26 weeks at 14..... | 416.) |

4. The Ludlow Textile School, Ludlow, Massachusetts. (47) This school was established in 1907. It is under the direction of the offisers of the Ludlow Manufacturing Associates, and is supported by that organization. The aim of the school is to give pupils a sufficient ground work for advancing in time to oversight of departments and mills. Tuition is free, the students being paid for school attendance.

For admission, pupils must have attained the 6th grade of the Grammar School. The academic instruction includes work in Arithmetic, Algebra, Shop Mathematics, Physics, American History, Textile History, Mechanical Drawing, English and Mechanics. A course in Wood and Metal Work is also provided. In the practical part or mill work, each boy spends five hours every working day caring for some machine or performing such work as is assigned to him in the mill. Every three months each apprentice is

transferred to another machine, or to other duties representing additional stages in the process of manufacture. The boys of the school are divided into two classes, so arranged that the work performed in the mill in the morning is continued by the other class in the afternoon. This order is reversed weekly. Three hours per day are devoted to school instruction and five hours per day to mill practice. The apprenticeship covers a period of four years of 11 months each year.

## Part VIII.

## The Training of Teachers for Industrial and Trade Schools.

The repid growth of the industrial education movement, due to the establishment of greater numbers of the State-aided systems of industrial education, has already made the supply of the trained teachers inadequate to meet the demand.

There are in operation certain methods of training teachers and still others are in partial operation, but none of these existing plans are said to be likely to furnish enough teachers possessing all the qualifieations desired. Thus the present agencies for the training of teachers for industrial and trade schools can not supply the demand, nor do they furnish adequate training.

To meet this need, the National Society for the Promotion of Industrial Education has made careful study and suggested many valuable plans concerning the training of teachers.

To go any further in to the problem, it will be necessary to attempt a definition of the terms.

Vocational teachers may be defined as "all those giving instruction of any kind which directly improves the vocational efficiency of the worker at his trade, such as shop practice, shop instruction, calculations used in the

shop, drawing used in the shop."(22)

Non-vocational teachers are "all those giving instruction of any kind which improves the general education or the civic effieiency of the student, such as English, General Science, General Mathematics, Civics and Economics."(22)

Thus, training of such teachers may be divided into three groups, 1, the training of the shop instructors; 2, the training of the teachers of the related subjects; and 3, the training of the non-vocational teachers.

This section will confine itself to the training of the vocational teacher, that is, the shop instructor and the teacher of the related subjects, not of the non-vocational teacher.

The following agencies may be said to be the sources from which in the main teachers have received such preparations as they have brought to the work, namely:1, the industry, supplying men directly from the trades; 2, technical institutions, such as the engineering school of college grade, like the Massachusetts Institute of Technology, Worcester Polytechnic Institute, and the engineering departments of colleges; 3, preparatory schools of less than college grade, such as State Normal Schools and Normal Colleges.

It is said that none of the above-mentioned schools

which are the present sources of such teachers can be regarded as altogether satisfactory or capable of furnishing any large number of thoroughly efficient persons. But there is the possibility of supplementing trade experience with special technical or normal training. Most of the most efficient shop,teachers and others in the field today have in some way obtained the preparation for their work.

The Report of the National Society for the Promotion of Industrial Education proposes valuable schemes which promise both a larger supply and a better training, than that afforded by present agencies.

According to Mr. Hamilton, editor of the report,(22), these plans for the training of teachers may be regarded as of two general types:1, plans for training of teachers before entrance to the service, and 2, plans for the training of teachers in service.

1, plans for the training of teachers before entering the service. (a) As to the training of the shop instructors it is said that the prospective shop instructor is expected to obtain his trade training in the industry, and bring to the preparatory school certain technical knowledge and a satisfactory general education. The purpose of the preparatory school in general is to supplement the students' technical training and to confer upon them their teaching equipment. To this end, for the training of the

shop instructor, four possible plans are suggested.

(1) A special state industrial and normal school.

(2) A special day course in the intermediate technical school and the technical college.

(3) Special evening courses in the above mentioned schools.

Of these, the all-day school of any kind, claiming all the students' working time for instruction, will reach but a limited number of persons of the proper experience because economic reasons make it impossible to forego wage-earning for a period of a year or so to get the training.

In view of the difficulties confronting the all-day schools, the one plan that offers immediate relief in any large way is said to be the evening school taking men with trade experience and training them in special classes for advantageous entrance to service as shop instructors in industrial and trade schools. For the training of the shop instructors, Mr. Hamilton concludes as follows:

"The evening training class for trade workers is the one plan which promises most immediate relief and the possibility of reaching and training a large supply of trade workers to meet present and future demands."

(b) As to the training plans for the teacher of related subjects, the duty of such a teacher as already pointed out, is that of teaching such subjects as shop

arithmetic and shop drawing in a practical way that will increase the trade efficiency of the student. The best equipped person for this service is either the shop instructor or some other man who has in addition to successful trade experience, an adequate knowledge of his special related subject. Recognizing this, it becomes necessary to consider plans for training such teachers under two heads: (1) Plans for training the trade worker, and (2) plans for training others than the trade worker.

(1) Plans for training the trade worker: It is expected that the trade worker who is to become a teacher of related subjects will bring to the preparatory school a good general education, some technical knowledge, and a trade experience adequate to the efficient performance of his work. The task of the preparatory school remains to give him the requisite and additional technical knowledge, and to train him in the art of teaching. For this work, special instruction could be given by any one of the four plans suggested for the training of the shop instructor. But the same difficulty in obtaining trade workers to take the training pointed out in the case of the shop instructor also holds for the teacher of related work recruited from the trade. It is believed that the day training class of the intermediate technical school and the evening training class in industrial centers seem to promise the best ways

to train teachers of related subjects; that the first is the better, but for the present time we must largely rely on the second plan.

(2) Plans for training others than trade workers to be teachers of related subjects. Although the instruction in technical subjects related to a given trade can best be given by a teacher who has had adequate experience in the trade, it is said that many instructors of related subjects without the trade equipment of a successful mechanic will be required to teach related subjects covering some trades offered by the schools in which they serve. In training these men the large problem is to give them in addition to their technical preparations this intelligent insight into the trades with which they must deal.

In order that industrial experience may be included in the course of training which the prospective teacher of related subjects who has had no experience must undergo, the following three plans are suggested: (a) To set up in trade schools a special training course designed to prepare the more advanced pupils and recent graduates for the service; (b) to establish a state industrial and normal school like that suggested in the training for shop instructor; and (c) to establish in the intermediate technical school and the engineering school of college grade, a training course for teachers similar to that already suggested in

the case of prospective shop instructors.

2. Plans for the training of the teachers after entering the service. The most effective plans for this purpose are said to be (1) the apprentice teacher plan, and (2) the summer or winter institution and conferences which serve as a training school for the after-training of teachers during vacation periods.

(1) The apprentice teacher plan. This is said to be one of the most effective plans for this purpose, and a device whereby a man who has already had experience in the trade but not teaching experience is placed in the school as an assistant to the shop instructor and where he learns how to teach while so employed. He is paid a nominal salary ranging from $500 to $600 per year, sufficient to support him during his apprenticeship stage. It is said that this plan enables the school to equip itself with suitable teachers entirely independent of other agencies; as compared with other plans it gives the future teacher an unusually wide and good opportunity to do practice teaching and it affords a chance to place teaching responsibility upon the apprentice in proportion as he shows himself able to meet it.

(2) The second plan is that of the summer or winter institutes and conferences. These institutes, like other

teachers' institutes are said to be successful only in proportion as they are wisely planned and conducted.

There are other plans such as training by the school staff whereby the instructors of the school meet together at frequent or stated intervals under the leadership of the director of the school for systematic study and round table discussion ofttheir experience, andproblems and the larger aspects of their work. (The Seminar System.)

The traveling supervisor is another means of giving after-training to the teacher. In this plan, the instructor experienced in the work of teaching and in the administration of industrial or trades schools is employed by the State to go from school to school and give instruction to teachers on methods of teaching and the problem of the work. Dt is said that this plan offers a method of reaching all the teachers in the service in the schools of the State through the systematic visits ahd organized work of a permanent training teacher who brings to bear upon local problems the experience gained through his observations and contact with all the schools and makes possible á minimum standardization of methods of giving instruction.

In conclusion, it may be said that all the plans above mentioned which were suggested and recommended by the National Society for the Promotion of Industrial Education are worth trying out by every State system of industrial

schools.

In Massachusetts, this problem of securing teachers sufficiently trained to carry on successfully the work of the industrial schools is claimed to be a serious one. To meet this need, evening courses for the training of such teachers have already been established in connection with the State-aided vocational schools in Boston, Lowell, New Bedford, Worcester and Springfield. The classes are open to a limited number of residents of Massachusetts, chiefly from the districts adjacent to the schools, who can meet the conditions of admission. The courses are maintained and conducted by the State. There is no tuition fee or other charge for attendance. The class for each district is limited not to exceed 15 men.

As a limited number of trades are as yet taught in State-aided vocational schools, classes for the training of teachers are open to men following the trades which are now taught, or trades which maybe taught in the near future.

The trades now taught in State-aided vocational schools include among others, machine shop work, tool making, house carpentry, inside finish work, cabinet making, steam engineering, electrical work, printing, and sheet metal work. It is said that it would be useless to train a man in this course, if there was no prospect of an demand for his services as a teacher.

About one hundred and fifty men have applied for admission to these courses, and sixty-five men have been admitted. These classes are now in operation. (1913-1914.) The students are distributed among the various trades as follows: 1 baker, 2 book binders, 1 cabinet maker, 8 carpenters, 3 draftsmen, 5 electricians, 1 steam engineer, 1 jeweler, 1 loom fixer, 17 machinists, 2 painters, 8 pattern makers, 4 plumbers, 5 printers, 2 sheet metal workers, and 4 tool makers.

According to a circular of information prepared by Mr. C. R. Allen, Agent of the Board in charge of training of vocational school teachers, to meet the need of trained teachers for State-aided vocational schools, the Board of Education, under authority of the Legislature, is putting into operation a plan whereby persons who already possess a knowledge of a trade may secure an opportunity for training in the principles and methods of teaching, in order that they may be qualified to teach in vocational schools.

To be admitted to these courses, a person must satisfy the State authorities that he possesses the following qualifications:

1. Age.- Not less than twenty-five or more than thirty five years of age.

2. Trade experience.- (a) A minimum trade experience, including three years of apprenticeship followed by at

least five years' experience in the trade, making a total of eight years. Men otherwise eligible, who have not served a definite apprenticeship, will be given consideration on the basis of such early experience in the trade as might be deemed equivalent to apprenticeship experience. (b)Some experience in a position requiring supervision of the work of others, such as working foreman or assistant foreman in a large plant or foreman in a small plant.

3. Good physical condition and personal charateristics which promise success as a teacher in a State-aided vocational school.

4. Educational qualifications.--In the case of prospective trade teachers, graduation from a grammar school or its equivalent. Any other education, such as evening school work, correspondence school work, and private study is taken into consideration as as equivalent for formal schooling.

In cases more than the limited number of qualified men from each trade enroll, the selection of the most promising applicants is said to be made on the basis of the following qualifications:

1. A wide experience, special skill, and an experience on a great variety of trade processes or a variety of jobs. Candidates may be asked to pass a shop examination in order to show that they possess such special information as

may be necessary.

2. A knowledge of drawing, shop calculations, the various materials used in the trade, various machines, tools and special processes. The degree to which the candidate possesses special qualifications along these lines may also be determined by examination.

3. Evidence that the candidate has secured superior training in subjects related to the more advanced work in his trade. Such training may be represented by advanced c correspondence school courses, attendance at evening schools such as the Lowell School for Industrial Foremen, Franklin Union and Wentworth Institute, or may be represented by advanced study carried on by the men himself in his spare time.

In closing this section a few points may be noticed as follows:

1. The Massachusetts Board of Education reports that at present the number of cities and towns where some form of vocational education is being maintained in this State is 47, and the number of students attending these schools is over 20,000. There are reasons to believe that these numbers are rapidly increasing.

2. It is evident that the efficient training of this large number of students depends almost entirely on the

securing of sufficiently trained teachers.

3. Up to the present time, no such system has made anything like adequate provision for training teachers for the work, except a few evening classes above mentioned.

4. It may be said that it is high time a definite plan for teachers should be worked out, otherwise progress will be retarded, by the lack of teachers who can meet the reasonable requirement essential for successful service in the field. Dr. Snedden said that "progress in industrial education would continue to be difficult and uncertain so long as there was no supply of trained teachers and leaders." (56)

5. The next step in this field of education in this State will undoubtably be the establishment of a more definite agency for the training of vocational teachers.

## Summary.

Within the past few years, Massachusetts has made great and rapid progress in industrial education. This is the first state in the Union to establish a commission investigating this form of education scientifically and to pass laws committing the State to engage in the establishment of industrial schools. This first commission not only has laid the foundation of the present situation of achievment, but also it has made great contribution to the present movement of industrial education in the United States. The report issued by this first commission in 1906 is claimed to have done more to shape thought and action throughout the country than any other volume written on the subject of industrial education.

In 1909, after the careful study of four years, Massachusetts has reorganized the State Board. Since the reorganization, the State has accomplished very important work in standardizing the various types of such schools that have come under its control in regard to scope, course of study and methods of instruction, as well as in furthering the establishment of a considerable number of schools.

It may be safe tosay that no other state has been more active in furthering this form of education. It is universally conceded that Massachusetts is the leading state in the land in industrial education.

However there may be some states in the Union in which some special type of schools have developed particularly to meet the special condition of the locality, as industrial education must be adapted in its content and methods as well as in its organization and administration to the social, industrial, and educational conditions of the community. For example, it is claimed that the co-operative plan is most developed in Cincinnati, Ohio, in the university , in high schools, and even in elementary schools there. In this state there are several schools of this type, such as Fitchburg High School, Hyde Park High School, Beverley Industrial School, and Quincy Industrial School, adopting a co-operative plan. While these schools are doing excellent work, Massachusetts seems to encourage more the establishment of schools on the school-shop plan than on the co-operative plan, recognizing more efficient correlation between academic subjects and shop practice in the training of pupils in schools with a shop attachment.

Thus at present Massachusetts has all kinds, grades and types of public and private industrial schools within its borders. Private institutions, such as the Wentworth Institute, Franklin Union, Lowell School for Industrial Foremen, and the Boston Y.M.C.A. are doing excellent work in this line. According to the authorities of the Massachusetts University Extension Commission, " no Western

State university provides opportunities equal to those which these institutions offer to the people of Boston." The types of private industrial schools which exist in the State at the present time may be summed up in the following classification: (a) Intermediate Industrial or Preparatory Trade Schools; (b) Trade Schools; (c) Technical Schools; (d) Apprenticeship Schools; (e) Technical and Practical Shop Courses in the evening schools; (f) Part-time Schools; (g) Continuation Schools; (h) Co-operative Schools. These schools throughout the State, are giving instruction to more than ten thousand people.

As to the public schools, there are 47 cities and towms in the State where some form of State-aided vocational education is maintained. The number of pupils attending State-aided vocational schools is 15,575, and beside these over 5,000 pupils are attending certain institutions not State-aided. Thus, the total number of pupils who are attending the public institutions is 20,575. (1913-1914.)

As it has been shown previously, the development of industrial education in Massachusetts has already approached a stage in which there is scarcely a type of school not in operation here at the present time. It may be safe to say that even the most progressive states of the Union may learn much from this State as to the most efficient methods of dealing with the organization, establishment and ef-

ficiency of these schools.

The present system of industrial education in Massachusetts may be summarized briefly as follows:

To encourage the establishment of industrial schools legislation has provided on the one hand for State aid to the amount of one-half the running expenses of such schools as may be approved by the State Board of Education, and on the other, has conferred wide authority upon the school committees under the general statute. This system has made possible the establishment of a large number of such schools throughout the State. Some of these schools are carried on by the community at its own expense and are connected with the regular publis schools, and others are carried on under the legislation making possible State aid.

Thus there have developed the following types of schools:

1. Under the general authority of the school committee. This is the plan to introduce into the high schools and the two upper grades of the grammar schools special courses training for industrial efficiency. This plan may be said to include (a) the establishment of an industrial course within the general high school, (b) the establishment of a technical high school, (c) the new form of part-time work based on the co-operative plan, and (d) the establishment of an industrial course in the seventh and

eighth grades of the elementary schools.

2. Under the special authority conferred by special legislation. Under the legislation of 1911, cities and towns may establish independent industrial schools controlled either by boards of trustees or by the local school committee. Practically all of these schools are conducted under Chapter 471, Acts of 1911, to meet with the approval of the State Board, and to receive reimbursement from the State. Under this plan, the following types of schools have been developed:

(1) Day schools. Since a commercial shop exists for turning out the products, there is a considerable difficulty in the training of students in such shops. This difficulty has been met by establishing their own shops, and up to the present time there have been two main types of schools:

(a) School Shop Plan--the shop is attached to the school. Here both the shop practice and the academic and technical instruction are to be given in the school.

(b) Co-operative Plan- the alternation between commercial shop and school. The academic and technical instruction are given in the school and the practice in the trade is given in the co-operative shops.

It should be noted that day schools of either type above mentioned assume full responsibility for the train-

ing of the pupil, both in the skill and in the related technical and academic work, as well as furnishing him for efficient and intelligent citizenship.

(c) Part-time and continuation schools. These schools are intended to give instruction in related technical and academic subjects to students who are employed during the day, such instruction being given during the working period. It has been that the more closely the related academic and technical work can be connected directly with the job, the more efficient is the educational side of the work and the greater the number of pupils who can profit by the work.

(2) Evening Schools. These schools are not intended to induct into a trade, but for the benifit of experienced workmen already engaged in an occupation to further perfect himself in his trade. For this purpose such course are restricted to persons over 17 years of age already engaged in the industry.

The general progress of industrial education in Massachusetts in the last few years has been somewhat as follows, as a writer states:"A tendency to pass from the school undertaking to give technical and academic work, leaving the industry to furnish the shop training to institutions undertaking to control both the shop training

and the academic and technical instruction."

It may be said that in general these schools are especially designed to deal effectively with the boy and girl of fourteen years. It has been found that in proportion as a close correlation is established between the shop and academic training, it is possible to deal successfully with more and more of these children and to hold them in school for a longer period. However the economic factor appears to have something to do with the problem, and under present conditions the great number of children employed in the State will not be effectively reached by the full-time day school, so that the present tendency seems to encourage the part-time school in addition to the full-time day school.

This condition is partially met by the evening courses after children have the industry. But physiological and other reasons would indicate the undesirability of dealing in evening school with children under 17 years of age who are working during the day.

It was reported that there were in this State 40,000 young people aged 14 to 17 years regularly employed in certain wage-earning occupations in 1913. For the benefit of these young people, the Compulsory Continuation School law was approved in June, 1913, (Chapter 105, Acts of 1913) but this act is said to be permissive, and up to the pres-

ent time only a limited number of courses of this character have been established. It appears, therefore, that the next step in the development will unquetionably be in the direction of the establishment of more and more part-time courses which will withdraw the young workers from the industry for a portion of the working hours and continue their academic and related technical education during that period in a part-time day school.

For the training of women and girls, up to the present time, there has been established but one type of day school which gives training mostly for the needle trades. A great number of such schools have been established in the State and these are aided by the State. The general policy seems to be a somewhat frequent alteration between a controlled trade experience in the shop and closely correlated academic and technical work. Most of these schools operate evening courses also for girls already engaged in industry under the limited conditions already mentioned in evening courses for men.

As to the household arts education for women and girls it may be said that Massachusetts seems to recognize the necessity of training women and girls for the efficient management of the household just as much as for training young people in connection with the productive side of industry. The same general statements above mentioned as

to the industrial work would apply here in the case of the agencies engaged in this work. Departments of home-making have been established in certain day schools, whose aim is to train for efficient management of the home, combined with a technical and academic training. It may be said that the general theory on which these departments are operated is to consider that the efficiency of the management of the home and the intelligent expenditure of income is as much a distinct trade or occupation as is an occupation by means of which money is earned, and to organize schools in general on the basis of the industrial schools.

Also part-time courses for home-making present the same general phase as the industrial training. These courses have been established for girls engaged in industry, who are released during a portion of the working week and attend a part-time day school for training looking forward toward home-making efficiency. While this work has been too recently established to afford a great deal of data, still there will be no question, that in the future this field will be largely developed and will bring very valuable results.

Evening courses in women's work have been largely conducted throughout the State. The restriction placed upon the attendance upon State-aided courses operated under Chapter 471 of the Acts of 1911, prevented the attendance

of girls engaged in wage-earning occupations. But, recognizing the desirability of such training, the legislature of 1912 made it possible for such courses giving training for domestic efficiency to women and girls employed during the day without regard to the character of that employment. Thus, at present, in this State, women and girls of any line of wage-earning occupation, and house-mothers, or house-daughters, who take part in the home work, are eligible for such instruction.

If there is any type of school which is not in operation in this State at the present time, it is the correspondence school which has been so largely developed in Wisconsin in recent years. This probably is due to the fact that Wisconsin is more sparsely settled, since her area of 56,066 square miles is almost the size of New England, minus Vermont. While the population of Massachusetts is 3,366, 416, Wisconsin has only little over two-thirds as many people, namely, 2,333,860. Nevertheless, Massachusetts is on the way to begin this great work of the State Correspondence school movement connected with the Massachusetts University Extension Commission which has already been in existence for several years and doing a great work.

To take an example from the Wisconsin Correspondence Study Department connected with the State University, the movement is briefly as follows:

According to an official publication of the State University of Wisconsin, the Correspondence Study Department affords an opportunity for consecutive instruction. Regular courses of study are pursued to their conclusion, as in a school or at the University.

In correspondence work, a systematic set of lessons, grouped into courses, is sent out to each student. These lessons may be either printed or mimeographed. The student does the work assigned in each lesson and sends that work in to the University, where the instructor in charge of the subject makes suggestions and returns the corrected paper to the student.

A very important feature of the work is that correspondence students in a given locality are gathered into classes and from time to time meet the instructor; and thus they gain the great advantage of coming into living contact with their teacher.

A very wide range of subjects is offered by correspondence; the range is almost coextensive with the University. The courses offered are as follows:

Music
Mechanics
Mathematics
Political Economy
Political Science
Civil Engineering
Structural Engineering
Electrical Engineering
Business Administration
Pharmacy
Greek
Latin
German
Hebrew
English
History
Geology
Chemistry

Besides these there are special courses for women and girls, courses in cooking, home-keeping and the like.

The correspondence work is of two grades- that which has no relation to University instruction, and that which is of University grade. The students in the former class are largely those in industrial or business subjects. In engineering, the courses are planned to give the men the knowledge they need in a direct and practical manner.

Many of the men taking these courses have no more than a common school education. They are men in the shops who wish to be better mechanics and who wish to rise to higher positions. At the present time scattered throughout the State there are approximately 3,000 students enrolled in these technical subjects.

The business correspondence courses are taken by many in all ranks in business, from the office boy to the bank official. Each course is adapted to the particular group that undertakes the work. The purpose of these courses is to give specific aid to a man in this business; and also in every course the relation of the particular line to the whole business world is considered, and thus the outlook of the man is broadened.

The number of active correspondence students in 1912-1913 was 6,313, a larger number than those who took work at the University.

So much for the movement of the correspondence school in Wisconsin, in Massachusetts, this movement is not in operation as yet but the certainty of the establishment of the State Correspondence School in the near future may be seen in the Inaugural Address of Governor Walsh, to the Legislature, January 1915.

He speaks as follows:

"Let us provide for the boys and girls of our rural towns and for those sent into the workshops and factories at an early age, educational correspondence courses.

A boy or girl ought not, merely because he or she is poor and obliged to go to work early in life, to be compelled to pay correspondence schools for getting the education necessary to fit him for a more profitable vocation. The State should give, through its own correspondence school free lecture courses, depattmental demonstration work and other methods of university extension, all that private schools now supply to those able to pay for special instruction.

The correspondence work should not be merely of University grade; men and boys who have no more than a common school education should be provided with the information and means to rise to higher positions, in the shops in which they are employed as mechanics.

I urge that Wisconsin's admirable system of university extension be copied, or improved upon if possible, in every detail; and that a special state department be at once established, with adequate powers and facilities and a liberal financial provision, for this necessary work. Shortly I hope to be able to submit a detailed plan for your consideration."(58)

It seems therefore, that the next steps in the development of the educational movement in this State will unquestionably be in the establishment of the State Correspondence School in the near future.

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