A STUDY OF TRADE EDUCATION AND APPRENTICE TRAINING IN THE UNITED STATES WITH SPECIAL REFERENCE TO CERTAIN CORPORATION TRAINING PROGRAMS

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A STUDY OF TRADE EDUCATION AND APPRENTICE TRAINING IN THE UNITED STATES WITH SPECIAL REFERENCE TO CERTAIN CORPORATION TRAINING PROGRAMS

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CHAPTER I

INTRODUCTION

Since the beginning of recorded history, each civilization has faced the problem of transmitting education in trade skills to the succeeding generations. There is evidence that trade education has existed for many hundreds of years, and today there is still a question as to the most effective way of teaching the various skills.

Many corporations have established trade education programs in their factories in order to prepare workmen with a high degree of skill. Private interests have established trade schools to prepare individuals for jobs in industry. Public schools and colleges have also recognized the importance of training individuals for the various trade skills.

The idea of educating for trades in this country seems to have started in the year 1820. It was at that time that the first "mechanic's school" was started in the city of New York. Since then, trade education has evolved through a series of stages. The Lyceum or Public Lecture Movement, several types of trade schools, and the Vocational Education Movement represent certain trends to be considered. Study indicates that, interwoven with the preceding, was a rebirth

of a system of apprenticeship considered essential by present-day executives of organized labor and management.

Federal legislation, on several occasions, has provided for trade education. The Smith-Hughes Act of 1917, the National Recovery Act of 1934, and the Fitzgerald Act of 1937 all provided for and promoted trade education. Since the enactment of the Veterans Readjustment Act of 1944, trade education, both on the job and in schools, has been made possible for a large number of men and women by providing financial assistance during the learning period.

The most effective method in imparting trade education is a moot question. John Rowlett, in his study of "Ancient and Medieval Craftsmen," has concluded:

> 1. Trade training on the job is the most effective means of trade education.
> 2. Trade skills cannot be mastered in the average trade school. One of the major reasons for this is the fact that the conditions that exist in industry cannot be reproduced in a school room.
> 3. It seems that the apprentice program advocated by the federal government is an evolution of the old guild apprenticeship. If it were supported by all parties concerned, an effective means of trade training might be found.[1]

Some of the points brought out were that actual working conditions could not be easily duplicated in a school room, and that the skills of a workman can be learned only by

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[1]John Rowlett, "A Study of the Ancient and Medieval Civilizations to Show the Influence of Their Training on Our Present-day Method of Trade Education," Unpublished Master's thesis, Department of Industrial Arts, North Texas State College, 1950, pp. 87-88.

constant application and practice on actual problems and jobs. Several questions arose from the study. What is the background of trade training in the United States? What is the attitude of organized labor toward the training of craftsmen? What has management done in order to prepare and maintain a body of skilled workmen? Certain aspects and implications of these questions form the basis for this study.

Statement of the Problem

This is a study of trade education and apprentice training in the United States with special reference to certain corporation training programs.

Delimitations

The problem is limited to a study of trade education below college grade in the United States since the beginning of the Mechanic's Institute Movement in 1820. The study will trace the development of trade education from 1920 to the present and will include apprentice training as advocated by the United States Department of Labor, organized labor, and management. The study is further limited to an examination of the trade training programs of ten corporations in the United States.

Sources of Material

The material used in this study was secured from books and periodicals, public documents of the United States

Government, The Texas State Approval Agency for veterans' education operating under Public Law 346, and bulletins and other literature on trade education provided by labor unions and the corporations included in this study.

Definitions of Terms

For the purposes of this study certain terms are defined as follows:

The term "apprentice" shall mean a person at least sixteen years of age who is covered by a written agreement registered with a State Apprenticeship Council (where no such council exists, registration is with the Federal Committee on Apprenticeship) providing for not less than 4,000 hours of reasonably continuous employment for such person, and for his participation in an approved schedule of work experience through employment, which should be supplemented by 144 hours per year of related classroom instruction.[2]

"Indenture" is used to indicate the agreement between the employer and the apprentice.

"Management" and "corporation" are used interchangeably to designate organizations or persons engaged in the business of manufacture and employing the services of skilled workers.

"Organized labor" is defined as those organizations whose purpose is to advance the welfare and interest of

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[2]United States Department of Labor, Bureau of Apprenticeship, The National Apprenticeship Program, pp. 1-2.

their members. In this case, the term has reference to trade organizations.

"Trade training" and "trade education" are used interchangeably to mean organized training in any specific, recognized employment classification.

Method of Procedure

In Chapter II a study of the trends in trade education will be made in order to show how present-day trade practices have evolved in the United States.

Chapter III will embody a study of apprentice training, showing its place as the earliest form of public education, its recognition by the Federal government, and the development of standards for training in the various trades.

Chapter IV will be a study of the in-plant trade training programs of eight selected corporations.

Chapter V will contain the summary and conclusions.

Related Studies

Much material concerning trade training has been published. This material varies from books written on specific phases of the subject to literature dealing with several aspects of trade education. Individual manufacturers have formulated and published standards of apprenticeship for factories, and labor unions have agreed upon these standards for the various trades.

Charles A. Bennett has probably presented the best historical background of trade education. Two volumes of his work were used for reference to specific dates and significant types of training programs, such as the Mechanic's Institute Movement,[3] with which this study begins, and the Vocational Education Movement, which began in 1906.[4]

In 1912 Frank Mitchell Leavitt wrote of the various types of industrial education that were characteristic of the period 1876 through 1906. In this book are related accounts of the function of the vocational high school, the trade school, the part-time cooperative schools, the continuation schools, and the intermediate or separate industrial school in perparing individuals for the trade.[5]

A complete treatment of the evening industrial school was given in 1930 by Charles A. Prosser. The evening industrial school was described as the device which must be used for the mass education of workers in their line of employment. In describing the relation of the evening school to trade education Prosser states:

> Through all the vicissitudes of its past, the evening industrial school has survived. Today it is, in point of number reached, the most extensive service now provided for trade and

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[3]Charles A. Bennett, History of Manual and Industrial Education up to 1870, p. 318.

[4]Charles A. Bennett, History of Manual and Industrial Education 1870-1917, pp. 517-546.

[5]Frank Mitchell Leavitt, Examples of Industrial Education, pp. 129-234.

> industrial education, and it has been growing more rapidly in enrollment than any other agency in this field of training. . .[6]

That it has a distinct place as a permanent institution which no other agency can fill is shown in this volume.

For the purpose of recent up-to-date evidence of the current types of trade schools, use was made of the latest edition of Vocational Education in a Democracy, by Charles A. Prosser and Thomas H. Quigley. In describing the types of schools prevailing Prosser and Quigley maintain that the following considerations are important:

> If the theory of general and impartial rather than limited and preferential service is to be worked out in practice, we evidently have two distinct groups whose needs must be considered: First, the group who have not yet entered into the employment for which they desire training. Second, the group who have already entered into employment and who wish further training either to improve themselves in their present position or to secure promotion. From the standpoint of organization, these two groups are in general served respectively by the full time day school and by some type of extension school. Each of these two fundamental kinds of schools has been developed in a number of ways to meet special situations.[7]

In summarizing the value of the extension school, the authors state:

> From the standpoint of social value, of the size of the groups which can actually be met and served, and of the immediate value of the educational

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[6]Charles A. Prosser, Adult Education: The Evening Industrial School, p. 14.

[7]Charles A. Prosser and Thomas H. Quigley, Vocational Education in a Democracy, p. 244.

> training secured, it is evident that the extension school is a far more important factor in our social and economic program than is the day school. This needs no argument. As vocational education has developed, it has become more and more apparent that while the full time day school can do most excellent work in training for specified occupations or "trades," it can never reach more than a small percentage of the great mass of citizens needing vocational training service. Hence it is not surprising that we find an increasing tendency to give more attention to the extension school as a far more efficient agency for using vocational education to promote desirable social ends.[8]

It is believed that the foregoing references are adequate to show the growth and present status of the trade-school method used to impart knowledge in trade skills.

Probably the most comprehensive study of American apprenticeship, its background, development and decay, was written by Paul H. Douglas. Douglas wrote of American apprenticeship and its relation to industrial education, its condition prior to the factory period, and its decline in the machine era.

In direct contrast to the present attitude toward training in the skilled trades, Douglas wrote the following:

> . . .the division of labor was the real destroyer of apprenticeship. Industry developed so many subdivisions that all-round training was both expensive and useless. This same obstacle confronts any scheme for industrial education today. Many loose-thinking advocates of vocational education have ignored this fact and have assumed that there is a limitless demand for skilled workers. Such is not the case. Modern industry does not require a large percentage of all-round skilled workmen.

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[8] Ibid., p. 260.

> The vast majority of jobs can be learned in the space of a few days or at the most, in a few weeks.[9]

This theory was, no doubt, well founded at the time, but it is believed that passage of time has altered the validity of the theory.

There is probably no other individual in a position to know more about trade education and apprenticeship training than William F. Patterson, Chief of the Apprentice Training Service of the United States Department of Labor. It would be difficult to piece together a full picture of apprentice training as it exists today without the use of his writings. Educating for Industry, written jointly by Patterson and M. H. Hedges, Director of Research, International Brotherhood of Electrical Workers, describes the policies and procedures of a national apprenticeship system. The volume makes the following statements concerning the attitudes toward the training of craftsmen:

> . . .As has been pointed out, America telescoped in the five years of war 25 years of industrial development. The nation increased its technological tempo but did not make sharp turns into new fields.
>
> Our gift for invention, discovery, and creation was stimulated by the momentous demands upon our national power. The principle that what can be imagined can be contrived was followed assiduously by Americans and with spectacular results. The B-29 became a model of adaptation of mechanical means to a given end. It has been called the greatest machine ever assembled by man. The application of collective effort, the mobilization of all the plans of a nation, and all the

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[9]Paul H. Douglas, American Apprenticeship and Industrial Education, p. 109.

> needed craft power on a given project, culminated in the atomic bomb.
>
> The war effort revealed the weakness of our industrial system, and though it is not the province of this book to describe all the weaknesses, one of them certainly was the inadequacy of our training of skilled men in industry--that is, the shortcomings of a national apprenticeship system.[10]

The above quotation concerning the training of craftsmen seems to bear out the present idea that skill cannot be acquired overnight.

Paul Bergevin, Director of Industrial and Adult Education in the Anderson Public Schools, Anderson, Indiana, deals extensively with apprentice training in a book which was published in 1947. The book is an account of Bergevin's experiences since 1924, when he began a four-year apprenticeship in the electrician trade. His interest carried through the years that he was a journeyman and an engineer and resulted in a detailed study of apprenticeship. In 1937 he organized an apprentice school to serve fifteen large and small industries in a community by way of directing the related instruction for all the participants and the practical shop instruction in several of the cooperating industries. The book Industrial Apprenticeship is the result of those experiences and a series of investigations concerning apprenticeship made during the period 1942-1947 in thirty plants and unions. It deals primarily with good apprenticeship standards.

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[10] William F. Patterson and M. H. Hedges, Educating for Industry, pp. 145-146.

Bergevin concludes:

> Regardless of how well established a program of apprenticeship education is in a plant or organization, it will bear occasional appraisal. Apprenticeship education, as a method of imparting information, is adaptable to many conditions and circumstances. Its adaptability is, to a large extent, responsible for its long existence. Apprenticeship has proved itself able to adjust to the trend of the times because it is a natural form of transferring information and experiences.[11]

He recommends the following essential principles of good apprenticeship:

1. Long-term planning for permanent apprentice education to provide for losses through promotions, retirements, and deaths is necessary.
2. The apprenticeship program should have the interest and good will of the employer.
3. The apprenticeship program should have the interest and good will of labor.
4. The apprentice program should be planned and controlled by management and labor through joint committees; or a trade advisory committee should be used if the program is controlled by management.
5. To be apprenticeable, a trade should take at least 4,000 clock hours to learn.
6. A logical ratio of apprentices to journeymen should be maintained.
7. The terms and conditions of apprenticeship should be stated in a written agreement.
8. Each trade should be analyzed. Then a basic work-training schedule, indicating processes to be taught, and a program of related instruction, based on this analysis, should be agreed upon and maintained.
9. The apprentice should receive regular wage increments, and a bonus upon completion of his course.
10. There should be a careful system of supervised rotation of apprentices to develop all-around craftsmen.
11. There should be a careful system of supervision and follow-up of apprentices.

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[11]Paul Bergevin, Industrial Apprenticeship, p. 205.

12. A careful system of records and shop and school reports should be established and maintained.

13. The apprentice educational program should include some social as well as technical training to enable the apprentice to recognize his responsibility to his fellow workers, his employer, and his community.

14. Shop or job instructors should be competent journeymen qualified to teach.

15. An apprentice should have a basic set of good tools accumulated as needed during his apprenticeship.

16. An apprentice should work and learn on actual jobs that are moving through the shop, commensurate with his skill.

17. All shop work-experiences should be carefully classified, related, and grouped for instructional purposes.

18. As far as possible, related instruction should be correlated with and given at the same time as the shop instruction.

19. The scope of the apprentice's knowledge of the work on the assigned machine, or on his assigned duties if machines are not involved, should be ascertained before he is permitted to move on to the next step in his course.

20. A system of regular reports on the progress of the apprentice in the shop or on the job is necessary.

21. Successful shop instruction places emphasis on instruction, not on production.

22. Shop foremen should understand the apprentice program, and their cooperation is necessary.

23. Related instruction should be given in a suitable room at a specific time.

24. A specific number of hours of related instruction (not less than 144 per calendar year) should be stated and given.

25. Related instructors should know basic theory, should have had practical working experience, and should possess teaching ability.

26. Apprentices should be required to attend related-information classes.

27. Periodic examinations should be given in related work.

28. A good testing program should be a part of the process of selection.

29. The candidate should be physically fit for the particular trade.

30. The candidate for apprenticeship should be morally sound.
31. The candidate should show interest in learning a trade.
32. The candidate should show aptitude for trade work.
33. The employing agent should use his own judgment in the final analysis regarding selection.[12]

In addition to the foregoing, thirteen other principles are treated in the book. All of these seemed to be worthwhile for purposes of evaluating an existing program.

Other related materials, without which this study would have been impossible, are the bulletins, pamphlets, and leaflets that were requested and received from manufacturers and the Apprentice Training Service, United States Department of Labor. These are acknowledged in the bibliography.

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[12] Ibid., pp. 207-209.

CHAPTER II

TRENDS IN TRADE EDUCATION

The Mechanic's Institute Movement

The first important institution designed to prepare intelligent and efficient workers and citizens in the United States was the "mechanic's school" established in 1820 by the General Society of Mechanics and Tradesmen of the City of New York.[1] The idea of providing schools for mechanics and tradesmen, as with almost all of our older educational institutions, was borrowed from England. Their real forerunner in the mother-country was the mechanic's institute, the first of which was established in Nottingham in 1798.[2]

The first school of this type in the United States was described by Bennett as follows:

> At first, attendance at the school was "confined to the children of indigent members, but afterwards other children were received at a small rate of tuition; but who paid and who did not was never known in the school. That was known only to the committee having the school in charge. The school was an excellent one. It was largely attended, popular, and for many years was self-supporting. It existed for thirty-six years, when, in 1858, it was discontinued in consequence of the general adoption throughout the city of the public school system.

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[1]Charles A. Bennett, History of Manual and Industrial Education up to 1870, p. 317.

[2]Ibid., p. 301.

> Upon its discontinuance, however, the present night school was established, which has proved even more successful in the free instruction of apprentices and journeymen, in architectural and mechanical drawing and in modeling for ornamental purposes.[3]

It is interesting to note the progress which trade education programs have made since that time.

The Lyceum Movement

The Lyceum Movement or Public Lecture Movement had, for its day, an intensive development in this country. The reason was that lyceums could be more easily supported by small communities. The lyceum was originated in 1826 by Josiah Holbrook. The movement gained momentum after he published a plan of popular education entitled American Lyceum of Science and the Arts. The Lyceum Movement gained the support of many prominent citizens and extended into other countries and placed emphasis on "useful knowledge."[4]

The evening schools of the mechanic's institutes failed to reach the working classes as did the lyceum movement. Some of the reasons were lack of adequate funds, instructional material and devices, and usable subject matter. Other contributing factors were the scarcity of competent instructors, unsound methods of instruction, no supervision, and the improper selection of students. No successful effort

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[3]Ibid., p. 318.

[4]Ibid., p. 326.

was made to achieve helpful working relations with other agencies.[5]

During the period 1850-1875, the American people were engrossed not only in the civil conflict between the states, but also in the development of a public system of education, in their enthusiasm for which the educational needs of employed workers were apparently forgotten. However, the idea of providing education for employed workers was kept alive by the mechanic's institutes that survived.[6]

Evening Drawing Schools

At the Centennial Exposition of 1876, the industrial and educational exhibit of the German Government made a great impression. Those exhibits demonstrated that the progress the Germans had made in the application of science and invention corresponded with the place which the products of their workshops had won in the world markets. Visitors were especially engrossed by the use which had been made of drawing in this industrial program. Prosser summarized the effect of the exhibits as follows:

> As a result, there arose in the industrial states of this country a pronounced movement which caused the introduction on a considerable scale of drawing in the regular schools, particularly in the secondary schools, and in the establishment of a considerable number of public evening drawing

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[5]Charles A. Prosser, Adult Education: the Evening Industrial School, pp. 4-5.

[6]Ibid., p. 9.

> schools. In Massachusetts, these evening schools of local communities were encouraged by State legislation. By the opening of the present century, however, this evening school movement had spent its force, and the typical evening drawing classes of that period had almost disappeared even in our most prosperous manufacturing cities. Doubtless these schools helped to pave the way for later efforts.[7]

This development was an important milestone in the progress of trade education in the United States.

The Development of the Various Types of Schools

With the increasing demands for more practical instruction in public schools and with the lessening of the opposition to the use of public funds to teach trades, a great variety of experiments in industrial education developed. In communities where the influence of labor unions persisted there was a strong tendency to provide preparatory trade education or prevocational training for boys and girls under sixteen years of age while they were still in the public schools, and part-time industrial-continuation schools for those who had left the day school and were working in industry. In other communities, where the influence of unions was not so strong, day-trade schools and part-time cooperative trade courses were established. According to Bennett, the following types of schools evolved, or were further developed, during the ten years from 1907 to 1917:

> . . . Among these were (a) the prevocational or industrial school, (b) the continuation school,

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[7] Ibid., p. 10.

> (c) the part-time cooperative school, (d) the day vocational or trade school, and (e) the apprenticeship or corporation school.[8]

Each of these schools was explained in detail by Bennett.

The prevocational or industrial school was intended to provide education of an industrial nature parallel to that of an academic nature which prevailed in grades seven through nine. This type of program was an enrichment or extension of the public school offering in these grades.[9]

The part-time cooperative school program provided that pupils spend alternate weeks in school and in commercially productive shops. This plan was put into operation in the teaching of trades in 1908.[10]

A continuation school is a school in which one who has left the full-time day school may continue his education. The number and kinds of these schools increased rapidly in America. Some were organized to extend the general education of those employed; others gave instruction related to specific trades and occupations; and a few gave not only related occupational instruction, but also shop or laboratory experiences in the practical processes of specific industries.[11]

In general, the day vocational or trade schools were intended to train skilled workmen before they entered employment. Not all of these attempted to produce a few completely

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[8]Charles A. Bennett, History of Manual and Industrial Education, 1870 to 1917, p. 528.

[9]Ibid., p. 528. [10]Ibid., p. 528. [11]Ibid., p. 532.

trained skilled workers. Some of the schools preferred to give less complete trade training to a larger group.[12]

The apprenticeship, or corporation, schools were maintained to provide instruction in mathematics, mechanical drawing, and other elements that were related to the particular industry served.[13] A more detailed study will be presented on the subject of apprenticeship training in a later chapter.

Prosser and Quigley summarized the types of vocational schools as to their present-day status:

> For the extension training of wage earners, the movement for vocational education has developed four types of schools: 1. the continuation school; 2. the part time extension school; 3. the evening extension school; and 4. the dull season extension school. Types 1 and 2 deal with immature young people still of the customary school age. Types 3 and 4 deal with the more mature group of men and women whose ages lie beyond those of the school group. All four types are characterized by the fact that, as distinguished from the full time day school, they deal with the great mass of prospective and mature citizens who have left the regular day school and have gone to work. The opportunity type combines certain characteristics of all.[14]

The extension type of school is important from the standpoint of the number of people served and their immediate need for training.

The vocational high schools differ from the types of trade training previously described because they require, as

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[12] Ibid., pp. 533-534. [13] Ibid., p. 535.

[14] C. A. Prosser and T. H. Quigley, Vocational Education in a Democracy, p. 259.

a foundation, the training of the elementary school. They also propose a broader and more thorough preparation for industrial pursuits. A four-year course is offered and completed by the pupils; however, the program is also adapted to the needs of those students who can spend but two years in the high school.

In the earlier days, there was a tendency in the larger cities in the direction of establishing and maintaining separate vocational high schools, such as the Stuyvesant High School, New York City; the High School of Commerce (for boys) and the Practical Arts High School (for girls), Boston; the Technical High School and the Commercial High School (for boys and girls), Cleveland; and the Lane Technical High School (for boys), Chicago. Schools of this type became well established during the period 1912 to 1917. Their programs were well diversified, varying from instruction in machine-shop and foundry practice, cabinet-making, pattern making, the building trades, and electrical work, to homemaking and housekeeping.[15]

The Vocational Education Movement

The types and growth of trade training programs have been discussed from their origin in the Mechanic's Institute Movement through the beginning of the Vocational Education Movement in 1906. Through the efforts of two men,

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[15]F. M. Leavitt, Examples of Industrial Education, p. 154.

James P. Haney, Director of Art and Manual Training in the Public Schools of New York City, and Charles R. Richards, Professor of Manual Training at Teachers College, Columbia University, the National Society for the Promotion of Industrial Education was formed in the United States. The chief goal of this society was to secure the passage of a federal law to provide national aid adequate for industrial education. Through a persistent program of public information the organization was instrumental in securing the passage of legislation in the form of the Smith-Hughes Act of 1917.[16]

Four other laws having the same general purposes have been enacted since that time, the latest being the George-Barden Act, which was signed by the President on August 1, 1946.[17] These laws will not be discussed in detail, but the three main groups of people who have been served by federal aid to vocational education are as follows:

> 1. Persons, usually of secondary school age, who are in full time school attendance for the purpose of acquiring the abilities, knowledge, and information needed to prepare them to enter some specific job or occupation. The needs of this group are usually served by all day schools or classes.
>
> 2. Young workers who have left the regular full time schools and have entered employment as learners or apprentices but who return to school for a part of their time to secure training which will improve their vocational knowledge or ability, or their civic intelligence. This group is served by the type of school or class usually known as "part time."

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[16]Charles A. Bennett, History of Manual and Industrial Education 1870-1917, pp. 517-576.

[17]Prosser and Quigley, op. cit., p. 437.

> 3. Adults who are primarily full time workers but who return to the vocational schools outside of their usual working hours in order to secure further training in the job or field of work in which they are, or have been employed. Their needs are usually met in the school organization known as the evening school or class.[18]

The extent to which the foregoing groups have been served by the three types of schools and classes mentioned is shown by Fig. 1, page 23, which shows enrollment from 1918 to 1945. The importance of part-time and evening schools is indicated by the fact that for the entire period these two types of educational programs have served over 50 per cent of the total number of students enrolled.

Recognizing the three main groups of individuals served by vocational education programs does not give an adequate idea of the scope of training which can be and has been presented or the various needs which may be met. The three main groups served by vocational training programs actually include many smaller groups having special needs and for which special training courses are offered. This is particularly true of the groups of workers enrolled in part-time and evening classes.[19]

The reason for the decrease in the enrollments from 1942 to 1945, indicated in Fig. 1, was that during that period, millions of persons were engaged in jobs pertaining to war production. The war production programs were under special war production legislation.[20]

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[18] Ibid., p. 446. [19] Ibid., p. 447. [20] Ibid., p. 447.

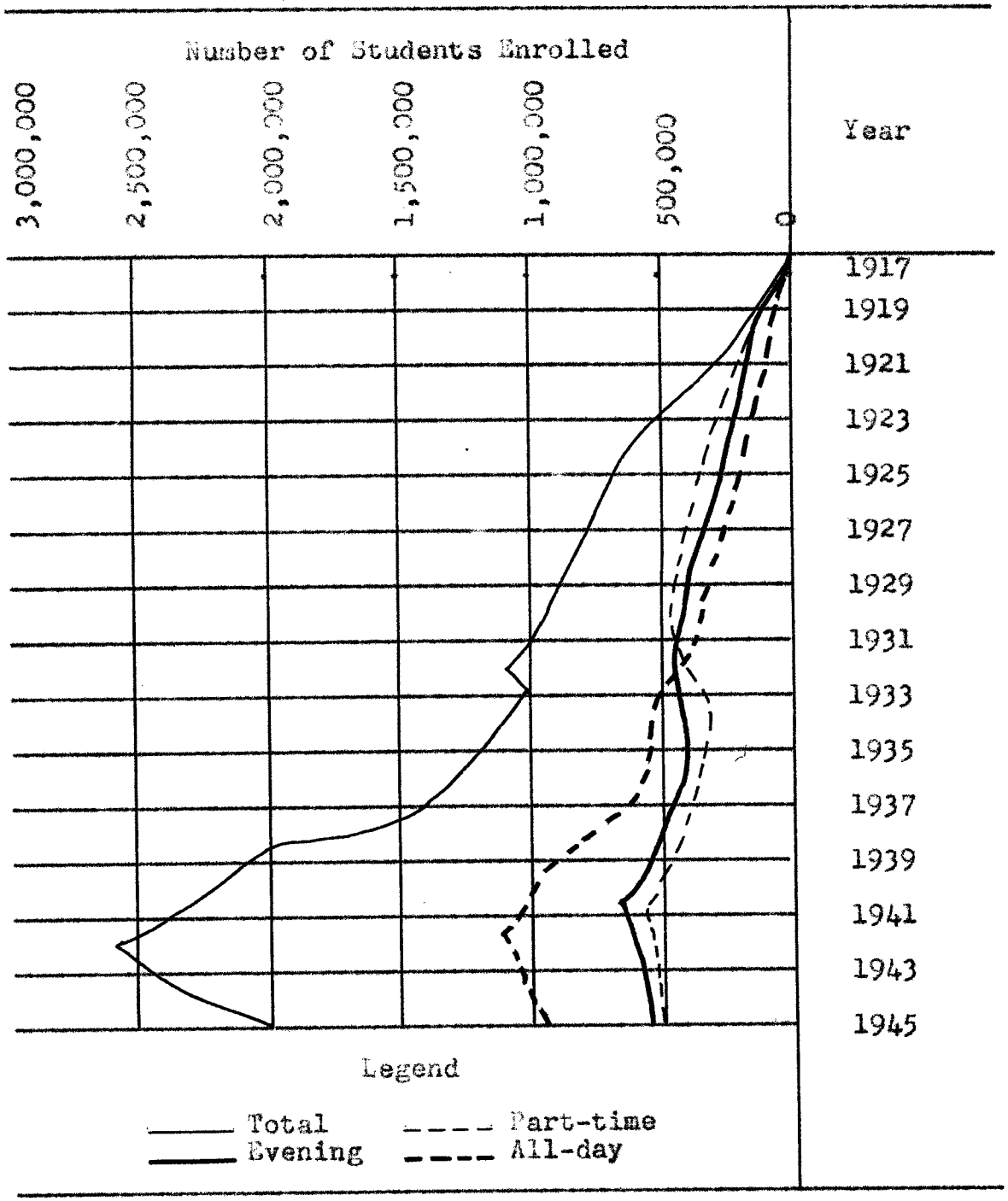

Fig. 1--Enrollment in federally aided vocational classes by types of classes 1918-1945.[21]

[21]Data secured from Charles A. Prosser and Thomas H. Quigley, Vocational Education in a Democracy, p. 448.

The Training Provided for Veterans by the Servicemen's Readjustment Act of 1944

One other trend in trade education is the education and training of veterans under the Servicemen's Readjustment Act of 1944. The purpose of that legislation was to enable returning veterans to recapture educational opportunities lost by reason of their entrance into military service during World War II, and to provide education or training for veterans in need of educational or occupational readjustment.

> The Education and Training program, under the direction of the Administrator of Veterans' Affairs, was authorized by title II of the Servicemen's Readjustment Act, Public Law 346, Seventy-eighth Congress, June 22, 1944 (38 U. S. C. 693g, 697c, 701, ch. 12 Veterans Regulations) which amends Public Law, No. 2, Seventy-third Congress, March 20, 1933, to provide education and training for veterans of World War II, and added part VIII to Veterans Regulation 1 (a), as amended. This legislation was amended and liberalized by the enactment of Public Law 268, Seventy-ninth Congress, December 28, 1945, Public Law 679, Seventy-ninth Congress, August 8, 1946, Public Law 377, Eightieth Congress, February 14, 1948, and Public Law 512, Eightieth Congress, May 4, 1948, (38 U. S. C. 697f, 697g, ch. 12 Veterans Regulations).[22]

The above quotation states the legal status of veteran's training, as amended, since its adoption.

The facilities for education and training as outlined by the Servicemen's Readjustment Act are as follows:

> Educational or training institutions include all public or private elementary, secondary, and

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[22] Manual Explanatory of the Privileges, Rights, and Benefits Provided for Veterans, 80th Congress, 2nd Section, House Document No. 745, p. 79.

> other accredited and approved schools furnishing education for adults, business schools and colleges, scientific and technical institutions, colleges, vocational schools, junior colleges, teachers' colleges, normal schools, professional schools, universities and other educational institutions, and also include business or other establishments providing apprentice or other training on the job, including those under the supervision of an approved college or university or any State department of education, or any State apprenticeship agency or State board of vocational education, or any State apprenticeship council or the Federal Apprentice Training Service established in accordance with Public Law 308, Seventy-fifth Congress, or any agency in the executive branch of the Federal Government authorized under other laws to supervise such training.[23]

This explanation of the facilities for training provided by the law seems important because of the large number of people affected.

In Texas alone, there are over 900 schools, both public and private, training veterans under the Servicemen's Readjustment Act. In addition to these schools, there are approximately 5,000 business firms offering training to veterans "on-the-job" under Public Law 679. The 900 schools include senior colleges, junior colleges, independent school districts, county vocational schools, flight schools, business schools, barbering and cosmetology schools, private trade schools, theological schools, and nursing schools and hospitals.[24]

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[23] Ibid., pp. 82-83.

[24] Letter from Oliver E. Meadows, Director Institutional Division, State of Texas, State Approval Agency for Veterans' Education operating under Public Law 346, May 26, 1950.

The trends in trade education have been traced. To summarize those trends briefly, they are the Mechanic's Institute Movement, the Lyceum Movement, and the Evening Drawing Schools which developed as early forms of trade education.

The development of the various types of schools such as the prevocational or industrial school, the continuation school, the part-time cooperative school, the day vocational or trade school, and the apprenticeship or corporation school was also noted. This group of schools and the types of training given in their programs form the basis for this study.

The Vocational Education Movement was introduced as a trend that resulted in federal aid to vocational education. Several types of vocational classes were provided for by the Smith-Hughes Act, a law providing government funds to promote vocational education. The Servicemen's Readjustment Act of 1944 provided financial assistance to veterans of World War II in securing education in trade skills. The types of training available to veterans was shown.

All of those trends, no doubt, are important. Chapter III will show the place of apprentice training as the earliest form of public education in the United States, its recognition by the Federal Government, and the development of standards for training in the various trades.

CHAPTER III

APPRENTICE TRAINING

Historical Background

The institution of apprenticeship training has been an important part of the educational program since the time of recorded history. Ancient history reveals that apprenticeship existed 4,000 years ago. In the twenty-first century B. C., a Babylonian King, Hammurabi, set up a code to regulate apprenticeship training conducted at that time.[1]

Definite references to apprenticeship training during the period 427-347 B. C. are found in the writings of Plato. Further evidence that such training existed 2300 years ago was shown by Xenophon, an Athenian historian, when he wrote of the problem of indenture or contract for apprentices. Apprentice training involved or affected the economic lives of many people in England, and in 1563 the first comprehensive public law was enacted concerning its regulation. Under the Statute of Labourers and Apprentices, all tradesmen were required by law to have spent seven years as apprentices in their particular trade.[2]

Apprenticeship training in early America closely paralleled that of the English system. Free public schools did

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[1]Paul Bergevin, Industrial Apprenticeship, pp. 3-4.

[2]Ibid., pp. 5-7.

not exist as they do today, and there was no other way for the poor to acquire an education sufficient for earning a living. The apprentice became a part of the master's household, as was the practice in the English system of apprenticeship. This program of training involved the master in teaching the indentured to read and write and giving him instruction in religion.[3]

Some time before the Industrial Revolution certain defects appeared in the apprenticeship system of education. During medieval times the tradesman was both the artisan and the merchant, conducting both the manufacture and the sales of goods. With the advent of the Industrial Revolution the master became an employer and delegated the management of the apprentices to journeymen. As a result, the old family relationship of master and apprentice, a vital factor in the old system, was lost.[4]

The decline of the old apprenticeship system, hastened by the development of the factory system, was evident in the latter part of the eighteenth and the early part of the nineteenth century. An apprenticeship system did exist in the nineteenth century, but it was radically different from the apprenticeship system of earlier times. Paul Bergevin gave the following description of the circumstances that

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[3]Ibid., pp. 11-12.

[4]Charles A. Bennett, History of Manual and Industrial Education up to 1870, p. 270.

prevailed:

> . . . When little children and women could attend power machinery, the skilled hand was no longer necessary in great numbers. The decline and eventual decay of early apprenticeship came about during these changing times, but the term "apprenticeship" continued to be used in many places. It was not, however, the apprenticeship that was known in preceding times.[5]

The change in the nature of apprenticeship appears to have been a result of a system of unrestricted competition and lack of public control.

With the arrival of the age of machines and mass production, situations developed that demanded skilled workers. The complex nature of designing, installing, and maintaining large or complicated machinery could not be entrusted to unskilled help. Because of specialization and a consequent division of labor, the knowledge of a few simple jobs was all that was necessary for one to be a productive employee. This was in direct contrast to the early apprenticeship system in America which Douglas so aptly described as "at once a punishment for debt, a penalty for idleness, a system of poor relief and the earliest educational institution."[6]

Public school participation in apprentice education had been negligible up to the 1930's, when industry and the schools began to combine their training facilities to give practical job instruction on the job and related technical

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[5]Bergevin, op. cit., p. 15.

[6]Paul H. Douglas, American Apprenticeship and Industrial Education, pp. 41-42.

instruction in the classroom. One advantage of this school-corporation plan was that, properly conducted, it made possible uniform instruction in all participating industries in a particular community.[7]

Laxness in apprenticeship training has contributed to the false impression that mass production has eliminated skills. An example some people use is the case of the person working on the assembly line of an automobile factory in which his sole responsibility was the attaching of hub-caps to the wheels of the products as they moved by. Apprenticeship, like many other types of education, passed through a number of periods of change and development, but few have experienced a similar length of existence and have been able to adapt themselves to modern times.

> . . . One does not see the whole picture when he says, "apprenticeship is on the decline." Old-time apprenticeship is on the decline, it is true, and so are the horse and buggy and the building of canals, but modern apprenticeship is not, as testified by hundreds of manufacturing organizations, labor unions, and schools all over America that are spending great sums of money and considerable time operating modern apprentice-training programs.[8]

As an individual lays away savings for a possible emergency, so has industry invested in the training of skilled workmen for its eventual need or use.

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[7]Bergevin, op. cit., p. 20.

[8]Ibid., p. 24.

The most significant points in the history of apprenticeship in America have been reviewed. This historical background has been presented in order that a comparison, the old with the new, might be shown. How apprentice training was recognized by the Federal Government will now be shown.

Recognition of Apprentice Training by the Federal Government

The Federal Government entered the apprenticeship program through the National Recovery Act of 1934. A committee was created by administrative order and appointed by the Secretary of Labor. The Supreme Court ruled the National Recovery Act unconstitutional in 1935, but the Federal Committee on Apprentice Training continued under the Department of Labor and received some financial aid from the National Youth Administration. This arrangement continued until 1937, when the Fitzgerald Act of that year provided for a committee to promote and formulate apprenticeship standards throughout the country. The committee was placed under the direction of the Department of Labor, and the name was changed to the Federal Committee on Apprenticeship.[9] This committee was transferred by Executive Order to the Federal Security Agency, April 18, 1942, to the War Manpower Commission, September 17, 1945, and was returned to the Labor Department on September 19, 1945.

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[9] Ibid., p. 21.

The Federal program of apprenticeship is carried out by the Apprentice Training Service, which has twelve regional offices throughout the United States.[10] Aid in establishing sound programs of apprenticeship and other types of in-plant training programs is given through these offices.[11]

In enacting legislation concerning apprenticeship training, Congress restricted the government to stimulation, and gave the government no authority to compel in this field. Apprentices have their choice in selecting their occupation and the employer with whom they serve. Consequently, all persons concerned--management, labor, and apprentices--enter into apprenticeship programs of their own free will.

Organization and function of the apprentice training service.--Basic standards have been established to fit all of the skilled trades in order to have a "least common denominator." These are not ironclad rules, but are flexible and can be extended and supplemented to fit local conditions. The standards listed by the Apprentice Training Service are as follows:

> 1. An apprenticeable occupation is considered one which requires 4,000 or more hours to learn.
> 2. A schedule of the work processes to be learned on the job.
> 3. A progressively increasing scale of wages for the apprentice that should average not less than 50 per cent of the journeymen's rate over the period of apprenticeship.

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[10] See Appendix.

[11] The National Apprenticeship Program (author not given), United States Department of Labor, Apprentice Training Service, pp. 1 and 8.

> 4. Provision for related classroom instruction (144 hours per year of such instruction is normally considered necessary).
> 5. The terms and conditions of the employment and training of each apprentice to be stated in a written agreement and registered with the State Apprenticeship Council.
> 6. Review of local apprenticeship by a State Apprenticeship Council.
> 7. Apprenticeship should be jointly established by the employer and the employees.
> 8. Adequate supervision and the keeping of records should be required for all apprenticeship programs.[12]

William F. Patterson, Director of the Apprentice Training Service, gives the following basic minimum standards:

> The application of national basic minimum standards is accomplished, first, by inclusion in the national joint trade apprenticeship standards, and second, through their adoption by the states. According to the Fitzgerald Act, the Secretary of Labor was given the responsibility of formulating and promoting labor standards to safeguard apprentices. The advice and assistance of industry is invited and used in arriving at the standards. Once agreement is secured and the standards adopted, they become the minimum for all groups wishing to be recognized as participating in programs accredited by national apprenticeship authorities.[13]

Herein lies proof that Federal legislation has been of the stimulating nature rather than the compulsory.

The State apprenticeship councils consist of representatives of management and labor, a representative of the State Board for Vocational Education, and the State Department of Labor. With the Federal Standards as a guide, the State Councils establish their own standards. The industries are

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[12] Ibid., p. 2.

[13] W. F. Patterson and M. H. Hedges, Educating for Industry, p. 50.

asked to follow them in their programs. The State Council becomes a part of the National Apprenticeship System by securing recognition from the Apprentice Training Service. A list of recognized State Apprenticeship Councils is given in the Appendix.

Some national employee associations and trade unions have appointed apprenticeship committees to meet as joint management-labor committees to develop national trade apprenticeship standards. They encourage local employer and labor affiliates to establish training programs for apprentices.

> . . . These national joint trade committees are appointed by their own industries. However, they tie in very closely on a voluntary basis with the Apprentice-Training Service. The latter provides continuing service to them in the form of statistical reports, copies of new local trade training programs, names of persons appointed by local groups to serve on joint committees and special reports or analyses of trade training problems when requested. On the other hand, these committees furnish the Apprentice-Training Service advice on the handling of their respective industries.[14]

Thus a coordinated system is accomplished and it is believed to be of great benefit to the welfare of the tradesmen.

The Local Joint Trade Apprenticeship Committee is essential because the actual training of the apprentice takes place in the local communities. Therefore, all the efforts of state and national groups are concentrated on this level. Written standards which govern the employment and training of

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[14]The National Apprenticeship Program, op. cit., p. 2.

all apprentices and contain the procedures of supervision and examination are formulated locally. Other requirements included in the standards are stipulated education, aptitude, age limitations, wages, hours of work, and any other particulars which concern the apprentice as a worker.

The Plant Joint Committee is established where it is not practical for the plant to participate in a trade-wide apprenticeship program. This provision was made to take care of individual situations.

Apprenticeable trades recognized by the apprentice training service.--Table 1 below presents a list of apprenticeable trades. The list is neither comprehensive nor final. The fact that apprenticeability is determined by the schedule of work processes contained in learning a trade, and not by its name, should be kept in mind.

TABLE 1

LIST OF APPRENTICEABLE TRADES[15]

Trade	Years
Airplane mechanic	2 or 4
Artificial-limb maker	4
Asbestos worker	4
Automotive mechanic	3 or 4
Baker	3
Bookbinder	2 or 4
Blacksmith	4
Boatbuilder (small wooden)	4
Boilermaker	4
Brace maker, general	4
Brickmason or bricklayer	3

[15] Ibid., pp. 5-6.

TABLE 1--Continued

Trade	Years
Business-machine mechanic	2
Butcher	3
Cabinetmaker	4
Carman, railroad	4
Carpenter	4
Carpenter, ship	4
Cement finisher	2
Chef or cook	3
Compositor or printer	6
Coppersmith	4
Coremaker	4
Cosmetician	2
Dental technician	4
Designer, die	4
Designer, tool	4
Diamond sawyer	2
Diamond lopper	2
Diamond brilliandeerer	2
Die maker	4
Die sinker	7
Draftsman	3
Dressmaker (custom)	2
Electrician	4 or 5
Aircraft	
Construction	
Industrial	
Maintenance	
Lineman	
Electroplater	3 or 4
Elevator mechanic	4
Engineer, wood treating	3
Engraver	5
Glass blower (non-mechanical)	2 or 3
Glazier	3
Glove cutter, table	3
Goldsmith	4
Instrument maker	4
Instrument mechanic	4
Iron worker, structural	2
Iron worker, ornamental	4
Jeweler	4
Jig builder	4
Joiner	4
Lather, metal	2
Lather, wood	2
Lead burner	4
Lens grinder	3 or 4

TABLE 1--Continued

Trade	Years
Linoleum, carpet, and soft tile layer	3 or 4
Loom fixer	3 or 4
Machinist	4
Aircraft	
Automotive	
Marine	
Railroad	
Shipyard	
Meat cutter	3
Mechanic, maintenance	3 or 4
Millman	3 or 4
Millwright	4
Model maker, aircraft, jewelry, etc.	4
Molder	4
Mold maker, jewelry	4
Motor repairmen, electric	3 or 4
Operating and stationary engineer	2 or 4
Painter	3
Paperhanger	3
Patternmaker: metal, wood	5
Pipefitter	4 or 5
Plasterer	3
Plumber	4 or 5
Pressman, printing	5
Radio repair and service mechanic	2 or 3
Refrigerator mechanic	3 or 4
Rigger	2 or 3
Sewing machine mechanic (garment industry)	2 or 3
Sheet metal worker	4
Aircraft	
Automotive	
Construction	
Industrial	
Shipfitter	4
Shipwright	4
Ship loftsman	4
Shipyard rigger	2 or 3
Silversmith	4
Silverware polisher	3 or 4
Spinner, metal	3 or 4
Steamfitter	4 or 5
Stonemason	3
Stone setter, jewelry	3 or 4
Tailor	4
Terrazzo and Mosaic worker	3 or 4
Tile layer	3
Tool and die maker	4

TABLE 1--Continued

Trade	Years
Turner, roll	4
Upholster and trimmer	3 or 4
Watchmaker	3 or 4

As previously stated, the basic standards are flexible. Therefore, when advanced technology provides a condition which starts a new trade, it is logical to assume that this trade will be added. To cite an example of an apprenticeable trade not listed by the United States Department of Labor in the preceding table, the Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin, lists plate and structural layout as a three-year course in apprenticeship.[16]

The Relation of the States to the National Apprenticeship Program

There are several reasons why the states should augment the National Apprenticeship Program by providing sound systems of their own. For one, it appears to be an effective way of competing with the economic position and industrial growth of the other states. Other reasons are that state systems have brought labor and management closer together and have helped to place needed emphasis on skilled occupations.[17]

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[16] *There's Work to be Done, Apprentice Training Program of the Allis-Chalmers Manufacturing Company* (author not given), p. 13.

[17] Patterson and Hedges, *op. cit.* pp. 62-63.

It is human nature to oppose legislation for fear of undue control of one's activities; therefore, it has been indicated that legislation in this field of the compulsory type does not work. To cite an example, the following is quoted:

> In 1937, a national committee composed of representatives of state apprenticeship agencies, labor, management and government agencies drafted a "Suggested Language for a Voluntary Apprenticeship Bill." At the time, the work of that committee was highly commended, and the suggested language was approved by most groups concerned, but subsequent experience proved that it was not the ideal type of state legislation. The draft was too long and it embodied too many provisions regarding details. If the language had been couched in such phraseology that the state agency responsible could have seen its function as one of coordinated stimulation and promotion rather than administration, the plan would have been much better received by those in a position to do something about it.[18]

Some suggested principles on which to base the relationship of the states to the National Apprenticeship Program are that they should enable the state government to bring together labor and management for the purpose of developing standards of apprenticeship; they should also provide a system of registration of standards and of individual indentures. An apprenticeship council, appointed by the governor, is considered the backbone of a state law.

Recognizing the fact that apprenticeship training pays its own way, it is logical and obvious that authority for

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[18] Ibid., p. 64.

decisions within trades and areas should lie with labor and management. Most states having apprenticeship agencies have enacted laws concerning this aspect of apprenticeship training. A list of these agencies is given in the Appendix.

Trade Association Standards for Apprentice Training

From the beginning it has been shown that it was the craftsmen who taught the beginners the skills of the trade. The tradition has been to pass skills on to succeeding generations, at first by father to son, then by guilds, and later by trade unions. All organizations recognize the importance of maintaining properly trained mechanics. The International Typographical Union, considered the mother of the American trades union movement, states as follows its policy of trade education:

> Trade education has long been recognized as an important function of the International Typographical Union. The first step in this direction was the adoption of rules and regulations for selection and education of apprentices indentured in composing rooms under contract with local unions. The International Union has engaged in campaigns of education to induce employers to recognize their obligation to the apprentice. As a result of cooperation in this work the rules established by the Union for the government of apprentices have come to be generally recognized and accepted.
>
> As education and training of apprentices have become a fixed policy and placed upon a permanent basis, the educational opportunities have been extended to those seeking membership in the International Union and journeymen who desire to avail themselves of its advantages. A Bureau of Education has been organized and functions under the supervision of the President. Thousands of apprentices are enrolled and will become more competent

> craftsmen in the art preservative of all arts when they have finished the course of instruction prescribed by the International Typographical Union General Laws.[19]

With the support of an organization such as this, the program has had a good opportunity for success.

The American Foundrymen's Society is another example of a union which has adopted standards for the training of apprentices. The increased need for apprentice training in the foundry industry is cited from the Society's official apprentice-training standards booklet:

> Among the many types of jobs associated with foundry work, three occupations--molding, coremaking and patternmaking--represent the higher skills and require apprenticeship as the normal means of entry. Of the estimated 425,000 production workers employed in the foundry industry in 1946, over one-fourth, or 120,000 were classed among these three skilled trades, 75,000 as molders, 30,000 as coremakers, 15,000 as patternmakers.
>
> The 1940 census indicated that the median age of molders is about 42 years, with 15 percent over 54 years. On the basis of these figures, it is estimated that the average retirement rate of molders alone will exceed 1,500 a year.
>
> Skilled workmen are not born--they are made. Apprentice training is necessary to preserve and perpetuate trade skills. The trade skills of the molder, the coremaker and the patternmaker are basic to the foundry industry. Apprentice training is basic training.
>
> Whether admitted or recognized, employee training is constantly going on wherever men are learning to do work. Apprentice training is systematized employee training. An approved system of apprentice training enables the employer to hire his men while they are young, and to train them in his policies, in their responsibilities, and in the quality of workmanship required in his plant.

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[19] *Facts Concerning the Union* (author not given), International Typographical Union, pp. 17-18.

> The responsibility of training employees rests with each employer. This is no vague responsibility. The task of training skilled molders, coremakers and patternmakers is the obligation of every foundry in which molders, coremakers, and patternmakers are employed. A foundry can not expect other foundries to train its men. Each employer must assume the responsibility of training his own men himself. The better the job is done, the better trained the plant personnel will be, and the easier the task of the employer becomes. No industry can rise higher than the combined knowledge and skill of its own staff.[20]

Although these needs pertain to the specific trades mentioned, they appear to be general in nature, and it is believed that they reflect the entire picture.

The standards of the various trade associations are too numerous to list. The standards of the American Foundrymen's Society, one of the outstanding associations, are outlined in the Society's booklet. Those standards, as an illustrative example, will be treated in detail.[21]

The need for apprenticeship training standards is threefold:

> 1. They assist foundrymen in promoting apprentice training in their plants and communities.
> 2. They serve as a guide to foundrymen when they hire molders, coremakers or patternmakers. It will be known that an applicant trained under recommended standards will possess the necessary skill.
> 3. The skilled workman looking for work outside of the shop in which he was trained will have the advantage that he can show that he has served a nationally recognized apprenticeship.

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[20] Apprentice Training Standards for the Foundry Industry (author not given), American Foundrymen's Society, April, 1949, p. 1.

[21] Ibid., pp. 2-8.

These were specific needs cited by the Society and pertaining to foundrymen in particular.

The term of apprenticeship is based on a four-year norm. This period is recommended for the molding and coremaking trades, but because of the great diversity of skills envolved in the patternmaking trade five years is recommended. The term may be expressed in periods of months, weeks, or hours, depending on what the interested parties prefer, or what the law or standards provide.

All apprentices are subject to a probationary period not exceeding 1,000 hours or six months. This probationary period is required in order to determine whether the individual really wants to learn or has entered apprenticeship training just to have a job. It is generally agreed and accepted that either party may annul the agreement at any time during this period.

Qualifications for apprenticeship-training applicants include age, physical status, good citizenship, education, and personal factors such as honesty, patience, initiative, and a desire to learn. Although some companies doubt the value of the aptitude and mechanical ability tests, others who have used them have found them valuable in screening out those persons not suited.

Work experience is the backbone of the apprenticeship program. The apprentice works under close supervision of the journeyman in the shop, beginning with the simple processes

and working into the complex jobs. Table 2 below illustrates that type of progressive training schedule.

TABLE 2

WORK PROCESSES OR TRAINING UNITS
IN THE MOLDING TRADE

Units of Instruction to be Learned	Weeks	Hours
Pattern storage: pattern symbol numbers; pattern records; method of inventorying and storing pattern equipment; delivering and receiving patterns from the foundry.	4	160
Flask yard: determining flask sizes; fitting flasks; helping flask carpenter; interchangeable metal flasks.	2	80
Tool crib: learning names and uses of tools and supplies.	4	160
Sand control: assisting in preparation of molding sand, facing sand and core sand; sand testing; moisture control; clay control; grain fineness; permeability; strength.	6	240
Core room: assisting coremaker; core binders; filing; fitting; pasting; assembling; daubing; bench coremaking; large coremaking.	30	1200
Cleaning room: tumbling; hand grinding; sand blasting; hydraulic cleaning; chemical cleaning; pickling; heat treating; inspection.	6	240
Crane work: transportation and lifting problems within the foundry; learning to operate crane and other lifting and transportation equipment.	6	240
Foundry office: Assisting foreman; routing jobs; time study; cost analysis; losses.	6	240

TABLE 2--Continued

Units of Instruction to be Learned	Weeks	Hours
Pattern shop: assisting pattern-maker; wood patterns; mounted patterns; metal patterns; match plates; follow boards.	10	400
Metal control: assisting melter; patch cupola; repair ladles; help charge cupola; figure metal coke and flux charges; alloying; hand pouring; mechanical charging; mechanical pouring; crucible furnace melting; electric furnace melting; analyzing test specimens.	10	400
Molding floor: assisting molder; bench machine; dry sand; floor; die casting; precision casting; apprentice molder on floor.	100	4000
Related classroom work:	14	576
General: to provide for flexibility to meet local needs; individual differences among apprentices.	4	144
Total	200	8000

One of the faults of early apprenticeship systems in the United States was that when a trainee became expert in certain manipulative skills, there was a tendency to leave him at that phase in order to gain speed in production. The list of diversified work experiences listed in the preceding table, however, indicates that the situation has changed.

Related classroom instruction is subject matter pertaining to trade knowledge. It is recommended that the apprentice attend class in the local vocational or high school at least 144 hours each year. A suggested program might include instruction in blueprint reading, mechanical drawing, foundry chemistry and physics, and other subjects that pertain to the particular trade. The time of day that this instruction is to be given is left to the discretion of the employer. Some prefer to teach it during the day and pay the trainee for the time spent in class. Others have arrangements whereby the instruction is given outside working hours and no compensation is given.

The development of apprentice training in the United States has been shown. Apprenticeship was practically nonexistent before the Industrial Revolution; however, in later years, the Federal Government, labor, and management realized the need for training skilled craftsmen. As a result, there was a rebirth of a system of apprenticeship in this country. The efforts of the government and of labor organizations have been discussed. The following chapter is an analysis of the in-plant training programs conducted by management in certain corporations.

CHAPTER IV

CORPORATION IN-PLANT TRAINING

Following the economic depression of 1929, industry was compelled to reduce expenses wherever possible in order to survive. Not only was the training of workers neglected in this process, but some companies also refused to employ young unmarried men who wanted to learn a trade. This mistake was realized ten years later during World War II, when it became apparent that the supply of skilled craftsmen was inadequate. Since that time industrial training of all types has been revived with new enthusiasm.[1]

The training of craftsmen would be impossible without a place to work, machines to work on, and capital to finance the program. Management has the machines and capital, and labor has in its ranks the skilled craftsmen with the ability to teach skills on the job and in the classroom.[2] Therefore, it is logical to assume that the trade training program is a joint responsibility of management and labor. The preceding chapter revealed how the trade associations have accepted their responsibility. To treat all existing

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[1] Apprentice Training at Clinton Industries, Inc. (author not given), Clinton Industries, Inc., p. 1.

[2] Ibid., p. 2.

trade training programs conducted by management would not be possible within the limits of this thesis. The purpose of this chapter is to analyze the in-plant training programs of certain corporations believed to be representative of all those conducting training programs. The trade training programs selected for the study were those of manufacturers registered with the United States Department of Labor as successfully operating programs in the apprenticeship field.

The Allis-Chalmers Manufacturing Company Trade Training Program

The Allis-Chalmers Manufacturing Company, with plants in nine principal cities, produced over 1,600 different types of capital goods. Allis-Chalmers Manufacturing Company provides a great diversity of training programs in order to promote skill and self-confidence and to maintain an adequate supply of trained craftsmen. The training department offers thirteen apprentice courses, many special employee classes, a cooperative training course, a graduate training course for engineers, and a program of courses leading to the Master of Science degree in engineering.[3] Since the study was limited to that training below college grade, only the apprentice courses and the special classes will be considered.

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[3] The Door to Opportunity Swings Open (author not given), Allis-Chalmers Manufacturing Company, pp. 3-5.

To illustrate the seriousness with which this company accepts its responsibility for conducting training programs and the value placed upon them, the following is quoted:

> Allis-Chalmers and its predecessors have been training apprentices for more than a century--since the Civil War. During that period several thousand men have completed their apprenticeships. They have always been the backbone of the Company's production organization, turning out products of world fame.
>
> Young men who serve their period of indenture as apprentices at Allis-Chalmers are thoroughly trained in their trade. Upon completion of their apprenticeship they attain the rating of skilled workmen, and enjoy all the rights and privileges which go to journeymen. While it is true that an apprentice learns his trade at a lower rate of pay than helpers and learners who do not serve an apprenticeship, this initial disadvantage is more than made up after the apprentice becomes a journeyman. He is advanced at once to the rating of a skilled worker and enjoys this rating all his life, whereas the man who began as a helper finds it much harder to attain a skilled classification.[4]

The apprentice is taught the trade of his choice by skilled men. In addition to this he spends a portion of his time in classroom study related to his trade, for which he receives pay. The related instruction includes shop mathematics, mechanical drawing, blueprint reading, safety appliances, shop hygiene, English, and economics. Periodically, lectures are given by members of the company staff.[5]

Following is a description of the thirteen apprentice courses offered by the Allis-Chalmers Manufacturing Company:[6]

> Blacksmith.--Certain parts going into heavy machinery must first be forged. Forgings are made

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[4] Ibid., p. 9. [5] Ibid., p. 9. [6] Ibid., pp. 10-23.

in the blacksmith or forge shop, where equipment is available for making forgings of all kinds and sizes. High power steam hammers and hydraulic presses are used.

Blacksmith apprentices are required to have a high school education. The apprentice course lasts four years, during which time they learn hammer operating, light fire, heavy fire and forging machine work, bulldozer operating, heat treating, smith work, the welding of chains, and similar operations.

Brass molder.--In recent years the science of brass casting has advanced rapidly, so that today both the methods of casting and the mixtures which are used are extremely varied. This trade offers the prospective apprentice unusual opportunities.

During the years of his course the apprentice is given training and experience which will establish him as a first class brass molder.

The brass molder course lasts four years and does not require a high school education. The apprentice learns to mix sand, clean castings, do coremaking (both bench and floor work), assist the furnace tender in the firing of the furnace, mix different types of metals, do bench molding of small molds, and make medium sized and large castings.

Production electrician.--The fascinating world of electricity is open to the electrical apprentice. Allis-Chalmers designs and builds all kinds of heavy electrical equipment at the West Allis Works--motors, generators, transformers, mercury arc rectifiers, switchgear, switchboards, and other related equipment. The electrical apprentice is given the opportunity of working on every type of equipment--an opportunity which few firms in America are able to give.

The course lasts four years and requires a high school education. Every apprentice works in the Coil department, Commutator and Switchgear departments, Switchboard department, and on the test floor. He learns to wind and form stator coils, rotors and armatures. He helps the journeyman wind, form, solder and insulate small stators, rotors, and armatures. He assembles and erects transformers, regulators, rectifiers, motors, generators and switchboards. Further training is offered of an optional nature. This is chosen by the apprentice and approved by the apprentice supervisor and superintendent.

Iron molder.--Number one foundry at the West Allis Works of Allis-Chalmers is one of the largest in the world. In the two West Allis foundries the apprentice learns the latest methods of sand control, core control, handling and reclamation, and the use of modern hydraulic casting cleaning systems. There is great variety in the work, and the apprentice has the opportunity to familiarize himself with practically every type of equipment and method used in modern foundries.

The course lasts four years and does not require high school education. While the apprentice works as a molder helper he sifts sand and rams flasks. Later he works in the core room and learns core-making, both the bench and floor types. He then learns green sand molding for bench work, small molds and medium floor work. He also learns all types of molding with dry sand--floor, pit, loam and brick molding.

Machinist.--The Machinist shapes metal by the application of cutting tools, a type of work which requires coordination of mind and hand. Machine tools are of many types, and the apprentice gains a thorough knowledge of them all. Materials to be machined also are of many types, and the apprentice becomes familiar with the ways in which each type must be cut. He learns to read blueprints, and to thoroughly understand work which is in progress. Knowledge of these things constitutes the difference between a machinist and a machine operator.

The machinist apprentice course lasts four years and requires a high school education. The apprentice acts as layout helper and learns the different types and names of tools. He learns to read blueprints, to operate drill presses of all kinds, milling machines (both horizontal and vertical), screw machines, turret lathes, planers and slotters, engine lathes, boring mills and boring bars, and to do vise work, floor work and assembling.

Maintenance and production fitter.--This is the newest of our apprentice trades. The apprentice receives instruction and experience in machine installation and maintenance work within the production department.

Training covers installing and maintaining service on: water, steam, air, gas, oxygen and heating systems; production machinery in foundry, forge, tank and plate, and machine shops; steam turbine, gas turbine, blower and compressor test pit; condensers, crushers, transformers, generators, motors and rectifiers.

Mechanical draftsman.--Mechanical drafting is in many respects the heart of all engineering. New equipment must first be conceived, and drafting designs and plans must be prepared, before the equipment is fashioned in the shops. Good draftsmen are in demand, and to the mechanically minded young man this work is very pleasant, and frequently leads to good paying executive positions.

The course lasts three years and requires a high school education. The apprentice learns the proper use of drawing instruments, free-hand sketching, advanced detail drafting, assembly drawings of machines, slide rule, logarithms, trigonometry, strength of materials, gear calculations and gear layouts. Finally, he is given special training in the department of his choice.

Patternmaker.--Pattern making has an important function in the construction of heavy machinery, for without patterns iron or steel castings cannot be made. Intricate castings require intricate patterns, and the success of the casting operation is dependent upon the accuracy with which the pattern has been designed and constructed.

The apprentice course in pattern making lasts four years and requires a high school education. The apprentice does varnishing and helping on heavy work. He learns to turn core prints on a lathe. He does small plain bench work, small intricate work, general work and large work.

Plate and structural layout worker.--The fabricating and assembly of machinery and equipment from steel plates is becoming increasingly important. Plates must be cut and formed into shape, and then drilled and fitted. They must be pressed into different, sometimes intricate forms, and they must be punched and frequently flanged. . . . Electric motors and generators have frames and bases of fabricated plates. Transformers require plate steel tanks. Grinding mills, cement kilns, timber preserving cylinders, spiral casings for hydraulic turbines, steam condensers, bases for equipment such as centrifugal pumps, blowers, and steam turbines--all require fabricated steel plates.

The Plate and Structural Layout course lasts three years and requires a high school education. The apprentice becomes familiar with the names and uses of the different tools. He learns to operate punch presses, drill presses and shearing machines. He does both light and heavy plate work, including reaming, cutting, setting, tack welding and assembly.

He finally operates large punch presses, drill presses and planers, and does heavy layout and assembling.

Sheet metal worker.--The extremely wide diversity of Allis-Chalmers products affords the apprentice in sheet-metal working an unusual opportunity to get a thorough ground work in this trade. He is given a chance to make and assemble hoods, guards, pipes, elbows, down spouts and many other parts made of sheet metal for use on many Allis-Chalmers machines.

The course is four years in length and requires a high school education. The apprentice does machine work on rolls, brakes, shears, punch and drill presses. He learns to make general maintenance repairs, to work with gas and charcoal furnaces, to solder, braze and tack weld. He is given practical instruction in layout, and may engage in advanced layout work or advanced sheet metal work according to his choice, upon approval of the apprentice supervisor and superintendent.

Toolmaker.--At Allis-Chalmers a large toolmaking department is responsible for fashioning and maintaining innumerable jigs, fixtures and tools used in the manufacture of the company's large and varied line of machinery. The tool maker works to close measurements. Within the metal crafts the tool maker holds a high position.

The course in tool making is four years in length and requires a high school education. The apprentice learns to read blueprints, operate mill machines, cutters, reamers and spot facing cutters, planers, shapers, slotters, lathes and precision grinders. He also does vise work, including fitting and assembling.

Weldment fitter.--Modern machinery must be both strong and light in weight. In consequence, welding has taken on a new and increasing importance which grows every year. Many pieces of equipment which formerly were made of large and intricate castings are now fabricated by welding. Greater freedom is thereby allowed for changing design whenever necessary.

The weldment fitter apprentice takes a two-year course and must have a high school education. He learns grinding, straightening, and acetylene cutting of scrap steel. He does light fitting and electric welding. He learns acetylene cutting and gas welding. He does repair work on such equipment as condensers, turbines and guide vanes.

> Finally he learns to do all classes of fitting and electric welding, and to construct finished work from detailed drawings.
>
> Wood worker.--Few trades have the crafts background and offer as much personal interest and appeal as wood-working. . . workers have extensive opportunities to use every type of wood working machinery. Wood workers do special jobs, both on the bench and on the assembly floor, as required in our varied line of products.
>
> The wood working apprentice course lasts four years and requires a high school education. The apprentice works as a floor, machine and layout helper. He helps operate the dry kiln. He learns to read blueprints for small detail parts. He assembles detail parts on flour mill machinery. He learns to operate lathes, cut-off band and scroll saws, boring machines, dowel machines, jointers, matchers, planers and sticker machines, dado saws, tenoners, mortisers, and router machines. He does general bench and assembly work, including layout, setting and assembling.
>
> Special safety class.--Special safety classes are held for all shop apprentices once a month. The apprentices hear lectures and see demonstrations of safe and unsafe practices in the shop and how accidents can be prevented by working safely on the job. Movies and slides are also shown from time to time.
>
> Working safely means doing better work, and the employee who understands the results of thoughtlessness will be alert to watching what he is doing.

It is believed that the foregoing descriptions of the apprenticeable trade courses are self-explanatory. Obviously, a huge company, in business for the purpose of making money, would not operate anything but an adequate training program.

Other courses are offered by the training department for employees who are interested in special subjects. These courses are basic electricity, blue print reading, drafting for girls, company orientation, mechanical drawing, percision instruments, shop mathematics, shop sketching, shop trigonometry, the use of the slide rule, Spanish, and special

training. A number of the classes are regularly scheduled. The others are offered when there is a sufficient number of interested persons to warrant the formation of a class.[7]

The provision for special training appears to be significant in that when a group within a department becomes interested in a particular subject related to their work, the department head requests the training department to provide a course. An example of a special training request is as follows:

> . . . a course was requested in coil taping for a special group. The Training Department taught the group the various methods of lapping by showing a series of specially prepared colored slides.

Whatever the requirements, one session or many, the Training Department is equipped to do the job.[8]

Caterpillar Tractor Company

The Caterpillar Tractor Company of Peoria, Illinois, is another manufacturer who has recognized the value of training, "feeling that the responsibility of developing men is greater than the designing and building of engines and tractors."[9] A training program at "Caterpillar" was started in 1918, and has expanded since that time to include many phases of manufacturing and technical processes.

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[7]Ibid., pp. 24-33. [8]Ibid., p. 34.

[9]Trained Men (author not given), Caterpillar Tractor Co., p. 3.

The Training Department consists of thirty-four instructors and supervisors, well-lighted and air-conditioned classrooms, and a well-equipped technical library of study and supplementary material. In addition to the foregoing there are numerous training stations throughout the factory, a training machine shop, training welding booths, and a training foundry shop. Motion pictures and slides, models of measuring devices, and many other visual aids are used. The training of apprentices and trainees is supervised at all times by instructors both in the classroom and in the shop. At the time the latest training bulletin was printed, in 1948, 500 young men were enrolled in training courses, and over 1600 had completed training courses since 1930.[10]

Like the Allis-Chalmers Manufacturing Company, Caterpillar Tractor Company offers an engineering cooperative training course on the college level and a college graduate orientation course for college graduates. The in-plant training can be broken down into two divisions; they are apprentice courses of four years and trainee courses of two years in length. The training programs are similar in that corresponding trades are involved in the manufacturing processes. Wherever possible, duplicate explanation of work processes has been avoided.

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[10] Ibid., p. 3.

Apprentice courses.--The apprentice courses consist of the machinist, foundryman, and patternmaker trades. Applicants must be between the ages of sixteen and twenty, and have a high school education or its equivalent, and they must pass mechanical and aptitude tests to be eligible for the courses. A training agreement between the apprentice and the company is signed which sets forth the conditions, duration, and wage rates.[11] A description of the trades and schedules for some of the training courses follows:

> Machinist apprentice course.--The machinist is one who has the ability to set up and operate skillfully any basic machine tool, such as a lathe, milling machine, drill, grinder, shaper and boring mill. In addition to manual skill, a working knowledge of mechanical drawing and the ability to visualize the proper sequence of machining operations are required.
>
> Classroom work and actual shop work go hand in hand, for the good machinist must know theory and practice. Production work begins in the Training Shop on simple types of machines like speed drills, hand mills and other simple machine tools. Further production, as well as tool room experience, is gained on speed and radial drills, power milling machines, automatic lathes and external grinders. To widen the scope of training, miscellaneous factory operations in inspection and machine repair are included in the course.
>
> As a part of their regular work, and during their work day, apprentices attend classes on many subjects relating to their apprenticeship. Here is acquired the practical theory needed for the solution of the everyday shop problems. Classes are held three hours a week in Company classrooms.
>
> Foundryman apprentice course.--The foundryman's craft, the science of making objects from molten metals, is one of man's oldest crafts. Iron implements found in the Great Pyramid are believed to have been made 6000 years ago. Cast

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[11] Ibid., p. 22.

iron was made in China about 500 B. C. This branch of the metal industry has developed continuously from early times to now. From a crude beginning, it has become an art and a science.

In the last ten years, tremendous strides have been made in the development of the foundry industry and the application of foundry products to everyday life. These products are essential in almost every branch of American industry. Systematic sand control and blending methods, advanced melting practices coupled with intensive investigation of iron-alloy combinations, and modern molding methods have contributed greatly to the progress of the foundry industry.

The shop schedule for the foundryman apprentice covers every branch of the trade including molding, core-making, melting and pouring iron, and cleaning and inspection of castings. In addition, experience on drills, mills, lathes, and in wood and metal patternmaking is included. Classroom work, during working hours, provides the theory to supplement actual practice, including lectures, discussions and motion pictures. Models and other visual aids are used.

Patternmaker apprentices.--The patternmaking principle as applied today is the same as that used by the ancients who made patterns of wax, formed impressions in sand and poured molten metal to form bronze castings. Duplication by this process was slow and expensive. Wood was later used as a standard medium because large and small patterns can be constructed at reasonable cost. In our patternmaking program, two separate courses are available, wood and metal, both requiring a fundamental knowledge of the foundry as well as skill in wood working, interpretation of drawings and the visualization of the part of machine under construction. The majority of apprentices enrolled in this program are in the metal course. The patternmaker's work is directly related to the entire machine manufacturing process for quality castings can only be produced from fine patterns.

Both wood and metal patternmaking courses start with elementary work in wood and metal and this is followed by mold and core making in the foundry. As a part of his training, the apprentice learns how to repair patterns. From this basic training, he moves to the pattern shop for advanced work in metal or wood patternmaking. Classroom work, during working hours, supplements the shop schedule.[12]

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[12]Ibid., pp. 4-9.

These intensive courses obviously train craftsmen who form the nucleus of production for skill is developed in both hand and machine tools.

Trainee courses.--The added economic burden that the individual assumes with age makes it difficult for the older person to enter into an apprenticeship agreement. One with a family must receive, in a short time, higher pay than the unmarried apprentice receives. Therefore, Caterpillar Tractor Company has provided several two-year trainee courses, an account of which follows:

> Machine shop training courses.--Skilled men are needed to operate the machine tools of today and to learn of advances in machines and processes from day to day. Skillful operation of machines is necessary if mass production is to make more things available to all people--if living standards are to be raised. Both machines and operators have achieved much within the last few decades, for accuracy of workmanship today is within limits not even measurable a century ago. Here at "Caterpillar" is an opportunity for men who are interested in this field but who have passed the apprenticeship age. Most of the experience in the course is gained through actual work on both basic and complex machines used in manufacturing processes.
>
> The machinist trainee spends his first four weeks on drills in the Training Shop and moves to the shops in the plant. An important part of his course is classroom work, taken during working hours as his shop work progresses. Discussions, lectures and demonstrations mark the course. Motion pictures and other visual aids are also used.
>
> Welding training course.--Fabrication means a greater use of welding to many in the business of production today. Welding has proved itself superior in many ways and has made possible many improved designs. Many parts and assemblies at "Caterpillar" come from the welding booths.
>
> With a growing need for men who were skilled in welding processes, the Company established this

course in 1940. From it have come trained men with ability to maintain the high standards set by this Company.

Purpose of the shop schedule is to develop the trainee's skill in all position welding. This is accomplished by assigning trainees to a wide variety of production welding jobs, starting with those of an elementary nature and progressing to more advanced types of arc welding. Experience is gained in both light and heavy gauge work and includes training in welding with the use of fixtures.

Subjects related to welding are discussed during class periods held during the trainee's regular working hours. Thus the trainee is equipped with a working knowledge of useful information which will help him solve shop problems.

Sheet metal training course.--Modern design of "Caterpillar" products calls for the extensive use of sheet metal which is cut, shaped and formed by machinery and hand. Sheet metal trainees study the characteristics of metals, sheet metal layout and forming on presses and power tools. This course is concerned with the use of heavy gauge sheet metal, not the flexible material associated with the tinner's trade. The plant uses annually hundreds of tons of sheet steel, angles, channels and bars, and trainees gain experience in working with all of them.

The shop training schedule is arranged to familiarize the trainee with the general use of flat and shaped mill stock and the fabrication of various parts from these. Skill is developed in the operation of both hand and power tools. Trainees' shop work provides experience on punch presses and shears, oxyacetylene cutting and welding, and sheet metal layout and development work.

Classroom sessions are a regular part of the course. Held during working hours, they cover the fundamentals of fabrication work and include discussions, lectures and demonstrations.[13]

These courses differ in duration and content from the four-year apprenticeship programs. The effectiveness of these

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[13]Ibid., pp. 10-15.

and other in-plant training programs is no doubt reflected in the quality of the manufactured products.

A Comparison of Apprentice Training in Eight Companies

Eight of the ten companies used in this study were selected for a comparison of their training programs. Table 3, page 62, lists these companies and the apprenticeable trades that are offered by each of them. It is essential that the difference in the manufactured products, manufacturing methods, and the size of the different plants be taken into consideration in this comparison.

Logically, the manufactured products determine the types of trades envolved. The manufacturing methods and the size of the plants are also determining factors. One manufacturer's products might involve an extensive use of the welding trade, whereas another uses welding on a smaller scale, and includes it under the heading of blacksmithing. Such is the case of the Caterpillar Tractor Company and the Allis-Chalmers Manufacturing Company, respectively.

The Ford Motor Company also offers apprenticeship training for blacksmiths. Some welding is done in this course. A breakdown of the shop training at the Ford Motor Company shows 500 hours of welding and oxygraph burning included in the blacksmith course.[14] While no breakdown was given by the Allis-Chalmers Manufacturing Company, it is

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[14] Apprenticeship Standards (no author given), Ford Motor Company, p. 28.

TABLE 3[15]

APPRENTICEABLE TRADES IN EIGHT COMPANIES

Company	Blacksmith	Coremaker	Die Casting-Tool & Die Making Trade	Drafting	Die Making	Die Sinker	Electrician	Foundryman	Industrial Pyrometry	Industrial Machinist	Industrial Hydraulics	Locomotive Machinist	Machinist
Allis-Chalmers Mfg. Company	X						X						X
Brown and Sharp Mfg. Co.		X		X									X
Caterpillar Tractor Co.		X						X					X
Ford Motor Company	X	X			X		X		X	X	X	X	
General Electric Company				X									X
Hoover Co.			X										
International Harvester					X	X	X						X
Studebaker Corporation					X		X						

[15]Data compiled from literature published by the foregoing companies concerning their apprenticeable trades.

TABLE 3--Continued

Maintenance and Production Fitter	Millwright	Molder	Metal Body Building	Patternmaker-Wood	Patternmaker-Metal	Plate and Structural Layout Worker	Plumbing and Pipefitting	Power Generation	Sheet Metal	Steam Engineering, Stationary	Steam Fitter	Toolmaker	Tool and Die Heat-Treating	Welding	Weldment Fitter	Wood Worker	Wood Model Making
X		X		X	X	X			X			X			X	X	
		X		X	X												
				X	X				X					X			
		X	X	X	X		X		X	X			X				X
X		X		X	X							X					
				X	X							X					
	X			X	X				X		X	X					

assumed that a similar period is devoted to welding in their blacksmith course.

Coremaking, molding, and patternmaking are all related parts of the foundry trade. It is logical to assume that a large company can well afford to produce the entire article, from the pattern to the finished casting, whereas the smaller manufacturer must be satisfied with making the patterns and contracting the remainder of the processes to another company on a jobbing basis.

Although Table 3 presents the specific trades offered by the selected companies, the foregoing explanation was considered necessary to avoid confusion. Those differences in manufacturing methods and the goods produced by the companies are another reason why the standards recommended by the United States Department of Labor are flexible.

One trade which was not listed in Table 3, but which was approved June 1, 1949, by the Ford Motor Company, is the roll-turning and grinding apprenticeship. This trade consists of 8000 hours of shop training and includes 340 hours of related instruction. An additional 340 hours of home study also are required to complete the course.[15]

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[15] Ibid., p. 33A.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The study has indicated that the development of trade education and apprenticeship training in the United States has taken several forms. Each civilization since the beginning of recorded history has faced the problem of transmitting education in trade skills to the succeeding generations. The idea of educating for trades in this country started with the Mechanic's Institute Movement in 1820. The study has shown the development of trade training from that date to the present, with emphasis on apprentice training as advocated by the United States Department of Labor, organized labor, and management.

The trends in trade education were several during the period from 1820 to the present. Other than the Mechanic's Institute Movement, the Lyceum Movement had, for its day, an intensive development in this country. The reason was that lyceums could be easily supported by small communities.

The exhibits of the German Government at the Centennial Exposition of 1876 resulted in the establishment of a considerable number of evening drawing schools. The movement declined in the early part of the present century, but doubtless it helped to pave the way for later efforts. Evening

schools are known to exist in large numbers at the present time.

Various types of schools evolved and were further developed from the year 1907 to the present. Some of these were the continuation schools and the part-time extension schools which have as trainees immature young people still of the customary school age. In addition to the foregoing schools there were the evening extension schools and the dull-season extension schools. Programs of these latter schools were designed for the more mature groups of men and women.

The Vocational Education Movement was instrumental in securing federal aid to vocational education in the form of the Smith-Hughes Act of 1917. Four other federal laws having the same general purposes have been enacted since that time, the latest being the George-Barden Act of 1946.

Present-day vocational classes that have been served by federal aid to vocational education are the following: (1) all-day schools or classes attended by persons, usually of secondary school age, who are in full-time school attendance; (2) part-time schools or classes attended by young workers who have left the regular full-time schools and have entered employment as learners or apprentices; and (3) evening schools attended by adults who are primarily full-time workers who return to the vocational schools outside their usual working hours. Data indicate that part-time

and evening schools have served over 50 per cent of the total number enrolled.

One other trend in trade education was the Servicemen's Readjustment Act of 1944, which enabled veterans to recapture educational opportunities lost by reason of their service in World War II. In Texas alone, there are over 900 schools, both public and private, training veterans under the Servicemen's Readjustment Act. In addition to these schools, there are approximately 5,000 business firms offering training to veterans "on-the-job" under Public Law 679.

Ancient history reveals that apprentice training existed 4,000 years ago. In early America, it closely paralleled the old English system. Free public schools did not exist in the early period of United States development and apprenticeship was the only way for the poor to acquire an education.

The decline of the old apprenticeship system, hastened by the development of the factory system, was evident in the latter part of the eighteenth and the early part of the nineteenth century. A system did exist in the nineteenth century, but it was radically different from the apprenticeship system of early times.

In later years the Federal Government, labor, and management realized the need for training skilled craftsmen. As a result there was a rebirth of a system of apprenticeship in this country.

The Federal Government entered the apprenticeship program through the National Recovery Act of 1934, and in 1937 the Fitzgerald Act provided the Federal Committee on Apprentice Training authority to promote and formulate apprenticeship standards throughout the country.

The federal program of apprenticeship is carried out by the Apprentice Training Service, which has twelve regional offices located in the United States. Aid in establishing sound programs of apprenticeship is given through these offices.

Some of the states have established a close relation to the National Apprenticeship Program by enacting legislation of a stimulating type to enable the state government to bring together labor and management for the purpose of developing standards of apprenticeship. An apprenticeship council, appointed by the governor, is considered the backbone of a state law.

State apprenticeship programs have resulted in several developments. For one, the programs have been an effective way of competing with the economic position and industrial growth of other states.

Trade associations have recognized the importance of maintaining properly trained mechanics. Notable among these organizations are the International Typographical Union and the American Foundrymen's Society. They are two of the many

trade unions that have adopted basic standards for the training of apprentices.

Corporation in-plant training was a result of the need for a continuous supply of skilled craftsmen. The training of craftsmen would be impossible without a place to work, machines to work on, and capital to finance the program. Management has the machines and the capital, and labor has in its ranks the skilled craftsmen with the ability to teach skills on the job and in the classroom. An attempt was made to analyze the in-plant training programs of certain corporations believed to be representative of all those conducting training programs.

The Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin, which produces over 1,600 different types of capital goods, provides a great diversity of training programs. Its Training Department offers thirteen apprentice courses, many special employee classes, a cooperative training course, a graduate training course for engineers, and a program of courses leading to the Master of Science degree in engineering.

The Caterpillar Tractor Company of Peoria, Illinois, is another manufacturing firm that has recognized the value of training, its policy being that the responsibility of developing men is greater than that of designing and building of engines and tractors. The Training Department consists of thirty-four instructors and supervisors, well-lighted

and air-conditioned classrooms, and a well-equipped technical library of study and supplementary material. In addition to the foregoing there are numerous training stations throughout the factory, a training machine shop, training welding booths, and a training foundry shop. Motion pictures and slides, models of measuring devices, and many other visual aids are used. The training of apprentices and trainees is supervised at all times by instructors both in the classroom and in the shop.

The in-plant training program at the Caterpillar Tractor Company can be broken down into two divisions. These are apprentice courses of four years and trainee courses of two years in length.

Of the ten companies chosen for the study, eight were selected for a comparison of their training programs. The eight were the Allis-Chalmers Manufacturing Company, the Caterpillar Tractor Company, Browne and Sharpe Manufacturing Company, Ford Motor Company, General Electric Company, Hoover Company, International Harvester, and the Studebaker Corporation. The basis for selection was that the above-named companies were known by the Department of Labor to have been successfully operating in the apprenticeship field.

Conclusions

This study proposed to seek answers to three questions. Those questions and the answers believed to be correct are as follows:

1. What is the background of trade training in the United States? The study has shown that apprentice training in the United States was patterned from the old English system of apprenticeship. The early apprenticeship system declined and eventually decayed with the coming of the age of machines and mass production. Several types or trends of trade education evolved and were developed from 1820 to the present time. A national program of apprenticeship and several types of vocational schools now form integral parts of a nation-wide system of trade education.

2. What is the attitude of organized labor toward the training of craftsmen? Labor organizations want a program of training for skilled craftsmen. Proof of this is the fact that major trade associations have formulated basic standards for apprenticeship training providing a ratio of apprentices to journeymen agreeable to the joint labor-management committees. Other pertinent factors involving the trainee, such as duration and content of training courses, are also contained in the basic standards.

3. What has management done in order to maintain a body of skilled workmen? One of management's most valued assets is its skilled workmen. This is emphasized by the fact that certain leading companies have initiated training programs. The management included in this study has made an effort to maintain a body of skilled workmen by operating training programs.

Recommendations

This study was not broad enough in scope to warrant recommendations. It is suggested, however, that a further study of trade education might be made using a larger number of manufacturers.

APPENDIX

STATE APPRENTICESHIP AGENCIES

Alaska Apprenticeship Council,
Department of Labor,
Juneau, Alaska

Arizona Apprenticeship Council,
Industrial Commission,
Phoenix, Ariz.*

California Apprenticeship Council,
Department of Industrial Relations,
San Francisco, Calif.*

Connecticut Apprenticeship Council,
Department of Labor and Factory Inspection,
Hartford, Conn.

District of Columbia Apprentice Council,
District of Columbia Board of Commissioners,
Washington, D. C.*

Florida Apprenticeship Council,
Industrial Commission,
Tallahassee, Fla.*

Hawaii Apprenticeship Council,
Department of Labor and Industrial Relations,
Honolula, T. H.*

Iowa Apprenticeship Council,
Bureau of Labor,
Des Moines, Iowa

Kansas Apprenticeship Council,
Labor Department,
Topeka, Kansas

Kentucky Apprenticeship Council,
Department of Industrial Relations,
Frankfort, Ky.*

Louisiana Apprenticeship Council,
Department of Labor,
Baton Rouge 4, La.*

Maine Apprenticeship Council,
Department of Labor and Industry,
Augusta, Maine*

Massachusetts Apprenticeship Council
Department of Labor and Industries,
Boston, Mass.*

Minnesota Apprenticeship Council,
Industrial Commission,
St. Paul, Minn.*

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*State apprenticeship law enacted.

Montana Apprenticeship Council,
Department of Agriculture, Labor, and Industry,
Helena, Mont.*

Nevada Apprenticeship Council,
Department of Labor,
Carson City, Nev.*

New Hampshire Apprenticeship Council,
Bureau of Labor,
Concord, N. H.*

New Mexico Apprenticeship Council,
Labor and Industrial Commission,
Albuquerque, N. Mex.*

New York State Apprenticeship Council,
Department of Labor,
New York, N. Y.*

North Carolina Apprenticeship Council,
Department of Labor,
Raleigh, N. C.*

Ohio Apprenticeship Council,
Department of Industrial Relations,
Columbus, Ohio

Oregon Apprenticeship Council,
Bureau of Labor,
Portland, Oregon*

Pennsylvania Apprenticeship Council,
Department of Labor and Industry,
Harrisburg, Pa.

Apprenticeship Division,
Puerto Rico Apprenticeship Council,
Department of Labor,
San Juan, P. R.*

Rhode Island Apprenticeship Council,
Department of Labor,
Providence, R. I.

Utah Apprenticeship Council,
Utah Industrial Commission,
Salt Lake City, Utah*

Division of Apprenticeship,
Vermont Apprenticeship Council,
Department of Industrial Relations,
Montpelier, Vt.*

Virginia Apprenticeship Council,
Department of Labor and Industry,
Richmond, Va.*

Washington Apprenticeship Council,
Department of Labor and Industries,
Seattle, Wash.*

Wisconsin Industrial Comm.,
Madison, Wis.*

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*State apprenticeship law enacted.

THE FITZGERALD ACT

Public--No. 308--75th Congress
Chapter 663--1st Session
H. R. 7274

AN ACT

To enable the Department of Labor to formulate and promote the furtherance of labor standards necessary to safeguard the welfare of apprentices and to cooperate with the States in the promotion of such standards.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Labor is hereby authorized and directed to furmulate and promote the furtherance of labor standards necessary to safeguard the welfare of apprentices, to extend the application of such standards by encouraging the inclusion thereof in contracts of apprenticeship, to bring together employers and labor for the formulation of programs of apprenticeship, to cooperate with State agencies engaged in the formulation and promotion of standards of apprenticeship, and to cooperate with the National Youth Administration and with the Office of Education of the Department of the Interior in accordance with section 6 of the Act of February 23, 1917 (39 Stat. 932), as amended by Executive Order Numbered 6166, June 10, 1933, issued pursuant to an Act of June 30, 1932 (47 Stat. 414), as amended.

Sec. 2. The Secretary of Labor may publish information relating to existing and proposed labor standards of apprenticeship, and may appoint national advisory committees to serve without compensation. Such committees shall include representatives of employers, representatives of labor, educators, and officers of other executive departments, with the consent of the head of any such department.

Sec. 3. On and after the effective date of this Act the National Youth Administration shall be relieved of direct responsibility for the promotion of labor standards of apprenticeship as heretofore conducted through the division of apprentice training and shall transfer all records and papers relating to such activities to the custody of the Department of Labor. The Secretary of Labor is authorized to appoint such employees as he may from time to time find necessary for the administration of this act, with regard to existing laws applicable to the appointment and compensation of employees of the United States: Provided, however, that he may appoint persons now employed in division of apprentice training of the National Youth Administration

upon certification by the Civil Service Commission of their qualifications after nonassembled examinations.

Sec. 4. This Act shall take effect on July 1, 1937, or soon thereafter as it shall be approved.

Approved, August 16, 1937.

REGIONAL OFFICES BUREAU OF APPRENTICESHIP
UNITED STATES DEPARTMENT OF LABOR
1949

Region I (Maine, N. H., Vt., Mass., R. I., Conn.)	Joseph E. Johnson, Regional Supervisor, Bureau of Apprenticeship, Room 501, 18 Oliver Street, Boston 10, Mass.
Region II (New York State)	John M. Marion, Regional Supervisor, Bureau of Apprenticeship, Room 1318, 270 Broadway, New York 7, N. Y.
Region III (Deleware, New Jersey, Pennsylvania)	Thomas P. Kenney, Regional Supervisor, Bureau of Apprenticeship, Room 712, Widener Building, Juniper and Chestnut Streets, Philadelphia 7, Pa.
Region IV (District of Columbia, Maryland, North Carolina, Virginia, West Virginia)	Robert F. Handley, Regional Supervisor, Bureau of Apprenticeship, Room 1450, Temporary "U" Building, Twelfth and Constitution Avenue, NW., Washington, D. C.
Region V (Kentucky, Michigan, Ohio)	John R. Newland, Regional Supervisor, Bureau of Apprenticeship, 506 Ninth-Chester Building, Cleveland 14, Ohio
Region VI (Illinois, Indiana, Wisconsin)	Cecil L. Utterback, Regional Supervisor, Bureau of Apprenticeship, Room 404, 226 West Jackson Boulevard, Chicago 6, Ill.
Region VII (Alabama, Florida, Georgia, Mississippi, South Carolina, Tennessee)	Charles N. Conner, Regional Supervisor, Bureau of Apprenticeship, Room 921, Grant Building, Atlanta 3, Ga.

REGIONAL OFFICES--Continued

Region VIII (Iowa, Minnesota, Nebraska, North Dakota, South Dakota)	Cecil L. Utterback, Regional Supervisor, Bureau of Apprenticeship, 410 Pence Building, 730 Hennepin Avenue, Minneapolis 3, Minn.
Region IX (Arkansas, Kansas, Missouri, Oklahoma)	Taylor F. Custer, Regional Supervisor, Bureau of Apprenticeship, 1509 Fidelity Building, Kansas City 6, Mo.
Region X (Louisiana, New Mexico, Texas)	Travis J. Lewis, Regional Supervisor, Bureau of Apprenticeship, Room 1806, 1114 Commerce Street, Dallas 2, Texas
Region XI (Colorado, Idaho, Montano, Utah)	Clifford B. Noxon, Regional Supervisor, Bureau of Apprenticeship, Room 322-328, Commonwealth Building, Fifteenth and Stout Streets, Denver 2, Colorado
Region XII (Arizona, California, Nevada, Oregon, Washington)	Broncel R. Mathis, Regional Supervisor, Bureau of Apprenticeship, Room 417, Federal Office Building, Civic Center, Fulton and Levenworth Streets, San Francisco 2, Calif.

INTERNATIONAL HARVESTER COMPANY
APPRENTICESHIP AGREEMENT

THIS INDENTURE made and entered into in duplicate this _____day of_____, A. D. 19__, between_____Works of International Harvester Company, a corporation organized and doing business under the laws of the State of New Jersey, party of the first part, and _____, a minor, _____ years of age, on the ____ day of _____, A. D. 19__, and _____ being the _____ of said minor, parties of the second part, all of the City of _____, in the County of _____, and the State of _____.

Witnesseth:

The party of the first part, in consideration of the covenants and agreements of the parties of the second part hereinafter contained, and on condition that said covenants and agreements, and each thereof, of the parties of the second part be promptly, faithfully, fully and completely kept, carried out and performed, hereby covenants and agrees to and with the parties of the second part, including said minor, as follows:

1. To take said minor into its employee and service for eight thousand one hundred and sixty hours, to be computed from and after the date hereof, except as herein otherwise provided.

2. To teach said minor the trade of _____ as carried on by the party of the first part at its _____ _____ Works, at _____, in the State of _____, and to give to the said minor the instruction and assistance requisite to enable him to learn said trade.

APPRENTICESHIP AGREEMENT--Continued

3. To pay, as wages, to the said minor, on the usual pay day of the party of the first part, for the sole use and benefit of said minor, for each and every working hour said minor shall work for said party of the first part, during the term or period of this agreement as follows:

For the 1st 510 hours	_____	cents per hour
For the 2nd 510 hours	_____	cents per hour
For the 3rd 510 hours	_____	cents per hour
For the 4th 510 hours	_____	cents per hour
For the 5th 510 hours	_____	cents per hour
For the 6th 510 hours	_____	cents per hour
For the 7th 510 hours	_____	cents per hour
For the 8th 510 hours	_____	cents per hour
For the 9th 510 hours	_____	cents per hour
For the 10th 510 hours	_____	cents per hour
For the 11th 510 hours	_____	cents per hour
For the 12th 510 hours	_____	cents per hour
For the 13th 510 hours	_____	cents per hour
For the 14th 510 hours	_____	cents per hour
For the 15th 510 hours	_____	cents per hour
For the 16th 510 hours	_____	cents per hour

These wage rates shall be subject to any and all revisions made necessary by general changes in the wage rates of the party of the first part.

In addition, to make available to said minor, if so recommended by the Works Training Director, a credit of the following sums:

During the 1st year of apprenticeship	$50.00
During the 2nd year of apprenticeship	50.00
During the 3rd year of apprenticeship	25.00
During the 4th year of apprenticeship	25.00

This credit is intended to assist said minor in the purchase of the tools and materials requisite to the acquisition of the trade. Allowance of this credit shall be wholly optional with the party of the first part, and may be changed or withdrawn at any time.

The Company will issue to each apprentice, at the beginning of his course, a suitable tool box and certain textbooks. These articles, together with the tools purchased and charged against the credit provided by the Company until the apprentice satisfactorily completes his probationary period, whereupon they shall become his property.

APPRENTICESHIP AGREEMENT--Continued

4. Notwithstanding any other provision of this agreement, the first one thousand and twenty hours (usually six months) of service hereunder shall constitute a probationary or trial term, during which either the Company or the minor may terminate this indenture upon (5) days notice to the other.

In consideration of the foregoing agreements of the party of the first part, the parties of the second part hereby promise, covenant and agree as follows:

5. That the said minor shall and will remain with and serve the party of the first part, at the trade aforesaid, for the full term or period of said eight thousand one hundred and sixty hours, and shall and will diligently and faithfully work for and serve the party of the first part, during the said term, in such branch or branches of said trade as the Works Director of Training for the party of the first part may, from time to time, direct.

6. That the said minor shall and will work diligently and faithfully and learn said trade under the direction and instruction of the Works Director of Training for the party of the first part, and shall and will be governed by the shop rules and regulations of the party of the first part now in force or which may be adopted from time to time respecting such work, and shall and will, at all times, do and perform his work as skillfully as he may be able to do, and in all proper ways and by all legitimate means within his power advance and promote the interests of the party of the first part.

7. That the said minor shall and will faithfully obey all the lawful instructions of the foreman, Works Director of Training or Superintendent of the party of the first part, and faithfully keep all its trade and business secrets.

8. That should the said minor lose time during any period of his term of service, from any cause whatsoever, including any time lost by reason of a general suspension of work in the shop or factory, he shall not be paid for the time so lost. When the cause of such loss of time is removed, the minor shall resume his service at the rate of pay previously received, and shall not be considered as entering upon his next succeeding period of service or be eligible to receive the annual bonus above provided or the increased hourly rate applicable to such succeeding period of service, until he has performed a period of service equal to the time lost.

APPRENTICESHIP AGREEMENT--Continued

9. That the said minor shall be and is hereby authorized to receive the wages to become due and payable to him under the terms hereof at the time specified in this agreement.

10. This in the event the said minor shall not fully and completely keep, carry out and perform each and every one of the agreements on his part to be kept and performed, or if the party of the first part and its Works Director of Training in charge of such minor shall determine that the said minor is not competent to learn the trade aforesaid, the party of the first part shall have the full right, privilege and authority, immediately to discharge and dismiss the said minor from its employee and to terminate this agreement and all its obligations hereunder.

In witness whereof the parties have executed these presents in duplicate on the day and year first above written.

INTERNATIONAL HARVESTER COMPANY

(_____Works)

By_____
Superintendent

_____
Seal

_____
Seal

_____
Seal

CERTIFICATES OF REGISTRATION AND COMPLETION

UNITED ★ STATES ★ OF ★ AMERICA

Certificate of Registration

Apprenticeship Standards

This certifies that the program of apprenticeship named below has been registered as part of the National Apprenticeship Program in accordance with the standards recommended by the

Federal Committee on Apprenticeship

NATIONAL APPRENTICESHIP STANDARDS FOR COMMERCIAL ESTABLISHMENTS IN THE PHOTO-ENGRAVING INDUSTRY
(Jointly Sponsored by The American Photo-Engravers' Association)
(and The International Photo-Engravers' Union of North America)
for the trade classification of

Name PHOTO-ENGRAVER

City

State Nation Wide

Date August 1, 1949

Registry No. 72261-A

Wm F. Patterson
Director, Apprentice-Training Service
U. S. Department of Labor

Certificate of Completion of Apprenticeship

UNITED ★ STATES ★ OF ★ AMERICA

Sample

Know All Men By These Presents That

_____

has with merit fulfilled the terms of his Apprenticeship Agreement, entered into in accordance with the standards of the Federal Committee on Apprenticeship in the trade of

_____

and is hereby recognized as a qualified skilled worker together with all the rights, privileges and opportunities which pertain thereto.

WITNESS our signatures and seal this _____ day of _____, 19__

Issued by Ford Motor Company, Approved by

_____ SUPERVISOR, APPRENTICE TRAINING SECTION

_____ MANAGER, TRAINING DEPARTMENT

_____ SECRETARY, JOINT APPRENTICESHIP COMMITTEE

_____ CHAIRMAN, JOINT APPRENTICESHIP COMMITTEE

_____ DIRECTOR, BUREAU OF APPRENTICESHIP
U.S. DEPT OF LABOR

THE HOOVER COMPANY

STUDENTS SHOP WORK RECORD

JULY 1, 1937 TO SEPT. 1, 1941

STUDENTS NAME	LATHE (100 HRS. 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 2000)	SHAPER (1 2 3 4 5 6 7 8 1000)	VERT. MILL (1 2 3 4 5 6 7 8 1000)	HOR. MILL (1 2 3 500)	DRILL PRESS (1 2 3 4 5 6 7 8 1000)	GRINDERS (1 2 3 500)	BENCH (1 2 3 4 5 6 7 8 9 10 11 12 13 1500)
ASHBAUGH	THIS CLASS GRADUATED SEPT. 29 1939						
CARLE							
LAPPIN							
THOMPSON							
WISE R.S.							
1938 BEGERT	THIS CLASS GRADUATED AUG. 30 1940						
BRAUCHER							
FORSTER							
~~HOLDEN~~							
MASLINE							
MEYER							
MULHEIM							
STAHLER							
WILLAMAN							
WISE G.I.							
1937 CLARK R.	THIS CLASS GRADUATED						
DEEX							
GOLLOWAY							
~~HOAGE~~							
~~SCHILTZ~~							
~~SHANK~~							
~~WOLF~~							
YOUTZ							
~~CLARK~~	AUG. 29 1941						
DAHLER							
MARTIN							
SHEEHAN							
1938 BAILEY							
HARRISON R.							
MESSERLEY							
SLOAN							
SLUSS							
1939 BRUHN							
COREY							
FORNEY							
HARRISON P.							
HEFFNER							
VAN VORN							
1940 ASHBAUGH							
CLIMES							
DAHLER							
GANNON							
HALTER							
KINTZ							
~~MCKINNEY~~							
STAHLER							

SHOP WORK RECORDS

YEARLY SHOP WORK RECORD

THE HOOVER COMPANY

Name: Month: Year: Grade:

Operation	Hours worked per day																														Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Lathe																																
Shaper																																
Vertical mill																																
etc.																																

MONTHLY SHOP WORK RECORD

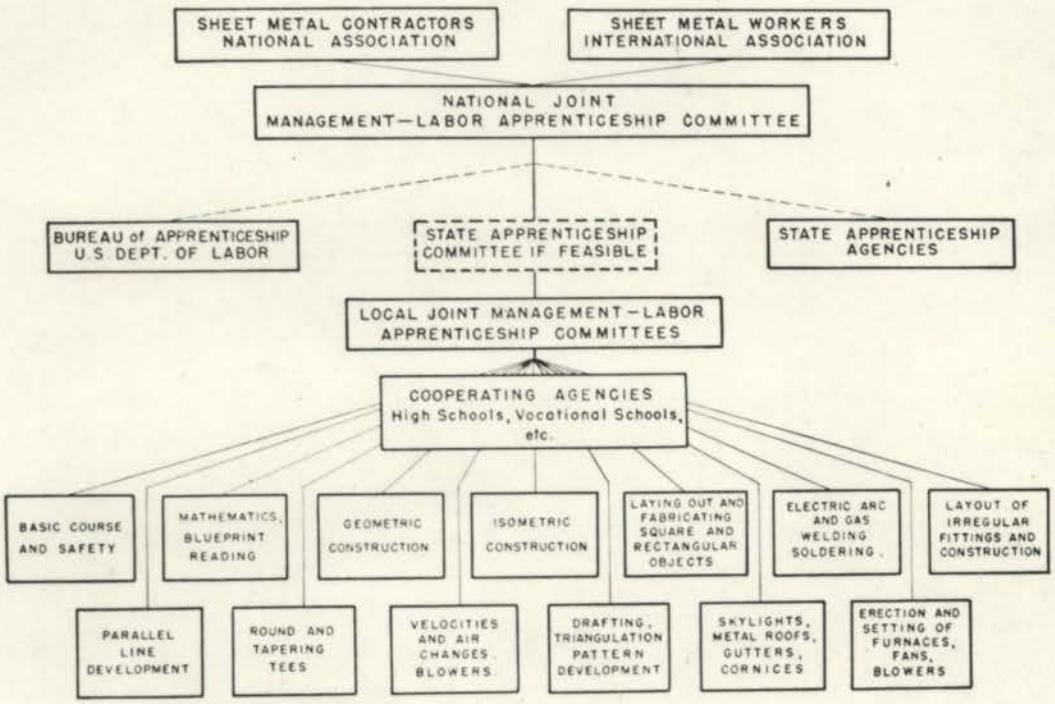
THE HOOVER COMPANY

Name: Year: Grade:

Operation	Carried forward	Hours worked per month											Cumulated Total
		Jan	Feb	Mar	Apr	May	Jly	Aug	Sep	Oct	Nov	Dec	
Lathe													
Shaper													
etc.													

ORGANIZATION OF THE APPRENTICESHIP SYSTEM OF THE SHEET METAL INDUSTRY

APPRENTICESHIP SYSTEM OF THE SHEET METAL INDUSTRY



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