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Scope of Study: This report consists of a survey of the industrial arts program in the separate schools of Dallas and a proposed program for those schools. The selected courses include woodworking, metal work, electrical work, mechanical drawing and automobile mechanics. An outline of procedure was presented. Also, a list of tools and equipment and their uses included.

Findings and Conclusions: The program of industrial arts in high schools has been undergoing a change in the last thirty years. The general shop was chosen because of its flexibility. The courses outlined in this report are intended to be flexible and may be changed to meet the needs of the students. The success of any industrial arts program is determined by how well the program is planned and administered. The writer has attempted to include material in the proposed courses of study that will meet the needs of the school and community.

Adviser's Approval C. L. Hill

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by

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# A SURVEY OF THE INDUSTRIAL ARTS PROGRAM IN THE SEPARATE SCHOOLS OF DALLAS AND A PROPOSED PROGRAM FOR THOSE SCHOOLS

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M. D.

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# CHAPTER I

## THE STUDY AND SOURCE OF INFORMATION

The material contained in this report covers a well defined period of development in manual instruction. In addition to the coverage of this period of development it is hoped by the writer that some definite program of organization can be reached. Industrial training has been carried on in some form or other since the time of primitive man. Vocational education which is a phase of industrial education is no new procedure in school programs. Very early in the development of industrial training in America, that method was chosen as a practical and economical means of aiding the children of ex-slaves in preparing them for economic independence. At the present time many Negro students look to the manual arts as the answer to an urgent problem of adaptability to a highly industrialized society. In the city of Dallas, as elsewhere, the agencies which shoulder this responsibility of administering this training are the high schools, night schools and trade schools. There are three negro high schools in Dallas, which offer some type of training in industrial arts. The writer has attempted to arrange in chronological order as nearly as possible the development of industrial education from primitive man to the present time, and to present a survey of industrial arts in the separate schools of Dallas, and propose a program for these schools.

Delimitation. This study is made to aid the present and future

industrial arts teachers in planning the arrangement of equipment and courses of study that will offer students a more desirable form of instruction. The writer feels that the study will be of great personal value, as an aid to becoming a better and more qualified teacher of industrial arts. As the title states, this study includes only the separate schools of Dallas.

Techniques Used. Two methods of research will be used to obtain information for this study. The first method of securing the needed information that presented itself was the questionnaire method. Other material was obtained from library sources. Information upon which the shop plan and the program of activities were based came from extensive survey of magazine articles, textbooks, interviews, personal experiences and judgment. At the conclusion of this study, some recommendations are made. Progress now being made in separate schools may mean that the recommendations may soon be realized.

Review of Similar Studies. A review of these, reports and other literature in the library of Oklahoma State University, revealed three similar studies. It is doubtful if any other research study concerning itself with the industrial arts program for the separate schools of Dallas has been made. If so, this writer has been unable to find that information. McCary made a study of the status of industrial arts in the negro schools of Oklahoma. In 1950, Wynn made a similar study dealing with a survey of the industrial arts program in the separate schools of Oklahoma. The third study was an investigation of the integration of separate high schools in Oklahoma. All of these studies were helpful in the writing of this report. In 1956, Ralph W. Johnson prepared,

by means of interview, a study of the industrial arts in the junior high school of Sherman, Texas, and proposed a program. While this study may appear similar in nature to the problem being studied by this writer, closer observation reveals it is completely dissimilar.

Outcomes to Be Expected. This study will serve as a basis on which to formulate an industrial arts program for the separate schools in Dallas. The knowledge and experiences gained by others should always prove helpful to one who plans to follow a similar line of work. This program includes:

1. Course of study for five shops.
2. A plan for a suitable shop building.
3. Suggested lists of equipment necessary for carrying on the program.

At the conclusion of this study, some recommendations are made. Progress now being made in separate schools may mean that the recommendations may soon be realized.

Uses of Outcomes. There are two groups of boys to be considered in the industrial arts training program. The first group is made up of those boys who need training that will enable them to enter the trade upon the completion of high school training. The second group is composed of boys who will go to college and prepare themselves for a professional occupation. This program has been planned, therefore, with two objectives in view:

1. To provide a course of training for the first group which will aid them in entering trades as semi-skilled workers upon leaving high school.

2. To provide for the second group the widest variety of experiences possible so as to develop a knowledge of trade training and to furnish a basis of selectivity of specific endeavor.

Since upon request a summary of the findings of this survey will be mailed to each person who answered the questionnaire, this may be of value to those who desire to improve the program now in use.

Definition of terms. The definitions of terms given in this section will represent the writer's interpretation of these terms. These definitions have been selected in the light of currently accepted philosophies.

> Manual Training. Manual training serves as a means to educate the individual on many sides by giving him different angles of perspectives by familiarizing him with world materials which classroom subjects alone cannot do. (5, page 13)

> Manual Arts. An early means of identifying shop instruction, usually of hand projects to develop hand skills (it was later changed to industrial arts). (6, page 32)

> Industrial Arts. Those phases of general education which deal with industry, its organization, materials, occupations, processes and products, and with the problems resulting from industrial and technological nature of society. (19, page 3)

> Industrial Education. A generic term including all educational activities concerned with modern industry and crafts, their raw materials, products, machines, personnel and problems. (9, page 7)

> Education. Some attempts to define education have taken the form of a statement of purposes or aims. In this manner, Struck called it "the acquisition of knowledges and skills that are useful for living". (18, page 5) For the purpose of this paper, education is interpreted as growth and development through experiences.

> The General Shop. A shop where two or more separate types of activities are taught at the same time by the same teacher. (15, page 25)

The Unit Shop. A shop where only one activity is taught at a time by one teacher. (15, page 98)

There are other terms used in this writing which deserve to be defined. Among these are:

1. Survey, a critical inspection of an area with regard to certain conditions.

2. Course of Study, a unit of instruction used in a specific situation.

These terms refer to areas of investigation treated in this writing.

In this chapter the writer has indicated the nature of this study and the reason for undertaking it. The methods used have been discussed, the uses for knowledge gained indicated, and the outcomes predicted. Before considering the survey and proposed program an effort will be made to present the history of industrial arts education and the current viewpoints and objectives of industrial arts education.

# CHAPTER II

## HISTORY AND PHILOSOPHY OF INDUSTRIAL ARTS

The history of industrial arts had its beginning when human life appeared on the earth and has steadily advanced from that time until the present. Because of the work of a good many leaders and reformers in the field of education, both known and unknown, the value of industrial knowledge, appreciation, and skill (industrial arts) is well intrenched in the program of studies of the modern educational institutions. A history of these leaders and reformers is the history of the industrial arts program, a history with its roots deep in prehistoric times.

### Part A

### Early History of Industrial Education

Manual skills were developed in the period of savagery to help the prehistoric creature secure food, provide shelter, and devise better weapons for the protection of himself and family. These skills were passed on to the next generation by imitation. Also new skills and procedures were developed by each descendant.

The Jews considered it a duty to teach their sons a trade. From Talmud, the traditional law of the Jews, Bennett cites the following, "As it is your duty to teach your son the law, teach him a trade." (1, pate 13) It was their belief that, unless the son was given an honest means of making a living, he was on his way to become a thief

or robber. The Greeks had an entirely different outlook on handwork. They held such labor in contempt, and slaves and lower classes did all the manual work. Yet these ill-fated craftsmen were the foundation upon which the Greek and Roman civilization grew, by continually improving and passing these skills on to the next generations.

Early Schools. It was largely through the efforts of Cassidorous, an Italian statesman and historian who later became a Benedictine monk in 538, that the art of book making was advanced. Having developed the art of book making, the monks copied manuscripts in long hand and bound them into books. They thereby established the only libraries of the age. Both young and old were attracted to their monastic schools because of the opportunities of using these libraries. Hence, they produced the only scholars of the period. Outside of the monastic schools, apprenticeship in the crafts had become the principal method of learning for the middle class. "During that time the master was supposed to give to his apprentice the same moral, religious, and civic instruction that he gave his own son." (2, page 21) Methods of instruction varied, but secrets of the trade were passed on to the apprentice.

New Ideas of Education. With the mastering of the art of printing (1423-1480) and the protestant reformation, new life was given to educational methods. Martin Luther (1483-1546) advocated state supported education for all children. Rabelais advanced his ideas of reform in education by writing two novels, Gargantua and Pantagrel. Rabelais, Comenius and Bacon saw the advantage of working with the things at hand to approach the abstract or the unknown. Rabelais did nothing of

importance to advance his theories, but his influence on the thinking of Locke and Rousseau was his contribution to education. Mulcaster (1531-1611) was the first to advocate drawing as one of the fundamental studies.

The Contributions of Rousseau. Jean Jacques Rousseau (1712-1778), with the writing of Emile, was the cause of an upheaval in educational thinking. The book was written about an imaginary son to express his ideas on education. In referring to hand work, he speaks of Emile learning more in an hour by actual experiences than he would from a whole day of verbal instruction. Rousseau believed that experience was the best teacher, and as a result of this belief he would have everything taught by action. In speaking of this, Bennett writes, "his recognition of the fact that manual arts may be a means of mental training marked the beginning of a new era of education." (2, page 81) Pestalozzi probably owes his influence on education to Rousseau. Eby and Arrowood, in writing of Rousseau and Pestalozzi, say:

> "Both were dreamers, and both were moved by down trodden men. The one influenced education profoundly through books, but was a failure as a teacher; the other exerted little power through his writing, but, by his methods of teaching, won the world for universal public education. However, had there been no Rousseau, we probably would never have heard of Pestalozzi. (4, page 619)

Pestalozzi, The "Father of Manual Training". Johann Heinrich Pestalozzi (1746-1872) was unsuccessful in practically everything he undertook, and yet through his failure probably had more influence on education than any other man up to his time. In writing of his failure, Eby and Arrowood state:

> Out of the depth and bitterness of his failure, he somehow succeeded in awakening the modern world, as no other was able to do, to a faith in the school as the supreme instrument for saving man from misery and prostration due to his own inaptitude. (6, page 619)

He believed that there were two methods of teaching, one from words to things and the other from things to words. His was the second one. Anderson states his chief aim as: "Pestalozzi's central aim was the elevation through education of the lower classes. For these he considered industrial training of fundamental importance." (1, page 76) His first intent was to teach manual arts as a means of making a living, but later came to consider them as a means of general education.

Effects of the Industrial Revolution. With the invention of the steam engine, the spinning jenny, the loom, the cotton gin and other labor saving machines, the standards for the craftsman were changed. No longer was he paid for his craft, but was driven in most cases to work in the factories along with his family beside unskilled workers. As a result, the apprenticeship method of instruction was no longer effective. Children, because of necessity, worked alongside their parents. Eventually the working conditions, and terrible living quarters, brought about child labor laws and labor reforms.

The Mechanics Institute Movement. The year 1800 is usually cited as the beginning of the Mechanics Institute movement. Dr. Birkbeck of London conceived the idea of giving scientific lectures to working classes on new inventions and the mechanical arts. Out of these lectures, and as a result of them, an independent institution, the Glasgow Mechanics Institute was formed. Chemistry, mechanics, geometry,

arithmetic, farrier, and architecture courses were taught with drawing courses being very successful. This movement made rapid progress in both, England and America.

Industrial education had advanced from the savage and barbaric states, through apprenticeship, and as a result of the industrial revolution, the Russian sloyd system was developed.

More Recent Foreign Development. The school of trades and industries of Moscow was reorganized in 1868 and became known as the Imperial Technical School. It was soon recognized as one of the leading schools of that time in Europe. The principal purpose of the school was to develop an educational program for civil and mechanical engineers, draftsmen, and chemists. The length of the course was six years and the method of instruction resembled that given at the "Ecole Centrale Des Arts Et Manufactrues in Paris where the course instruction was supplemented through practical experience in the workshop." (3, page 62)

The shops were manned by both, hired workers and students; as a result, more attention was given to work experiences and less to teaching. Consequently, this phase of learning proved unsatisfactory because of the imitative procedure. This led Della Vos, director of the school, to establish the instruction shops, or unit shops, separate from the production shops that were building industrial machinery. This educational achievement by Della Vos was the first attempt at organized vocational education for groups in the unit shop with each student having a work bench and a set of tools. This instruction was formal and consisted of making a series of exercise models, each exercise a little more difficult than the preceding model. This course of study

was developed through occupational analysis.

The Sloyd Movement. During the period of reorganization of the Imperial Technical School in Moscow, the other Northern countries of Europe (Finland, Denmark, Norway and Sweden) were developing the teaching ideas known as sloyd, expressed by many of the German educators in Scandinavian countries. The movement for this type of instruction in manual arts originated in Germany. Cygnaeus, (1810-1888), a Lutheran preacher and teacher, was given the task of working out a system of schools in Finland. Into these schools went a regular course of handwork, with the teacher of these arts being a regular professional teacher and not just a craftsman. The purpose of these crafts was to produce useful objects in the homes, both for home use and for sale. Also, it provided something to do during the long winter evenings when outside employment was impossible. The sloyd movement, which once flourished with vigor, started to decline when the invention of the steam engine provided power for mass production for these articles formerly made by hand in the homes. This left the men and boys with nothing to do in the long evenings but visit taverns in this period of the nineteenth century. Therefore, by 1846, this situation forced the people to organize associations to combat these evils of leisure. These associations convinced the leaders in national politics of the importance of sloyd.

The Swedish Government took action in 1872 to try to help the advancement of sloyd by granting an annual appropriation of 2,500 crowns, and later increased the amount to 27,000 crowns, to stimulate interest and instruction in sloyd, enabling Otto Saloman to establish a sloyd school in Nass in 1872. The school had a curriculum of carpentry, carving,

turning, blacksmithing, basketmaking, saddlery, stonecutting, fretwork, painting, drawing, mechanics, mathematics, and physics. The school used seven hours each day for sloyd and three hours for the rest of the instruction. Also, the school became an important influence in the sloyd movement in later years. (3, page 62) (1, page 80)

The industrial arts movement in Germany received much inspiration from these sloyd developments in Denmark and Sweden. In 1879-1880, the Leipzig Society for Public Welfare began a work shop for boys under the leadership of Waldemar Goetze (1843-1898) who was a very progressive leader in the manual training movement in Germany until his death. This industrial arts movement developed by Goetze in Leipzig soon spread over southern and central Germany. The developments were so rapid that by 1909 about forty percent of all eligible students took part in some form of manual training instruction.

French Influence. Manual training in France was being developed from an earlier type of shopwork instruction which was chiefly economic or industrial in purpose. Trade and Technical Schools for boys and girls of twelve years and older were being organized over the nation, and in 1827 the school of Christian Brothers of Saint Nicholas was established in Paris, followed by La Mertiniere School at Lyons in 1831. All of these European ideas in industrial arts had some influence on early American experiments in this field.

Part B

## Industrial Arts in the United States

The first schools in the United States grew out of the church as a direct result of the Protestant Revolt in Europe. The early settlers came to this country for freedom of worship, so the establishment of parochial schools was to be expected. In 1642 and 1647 laws were passed in Massachusetts which laid the foundation for all the American public school systems. These had to do with compulsory education, standards set and enforced by the state. As early as 1685, Thomas Budd proposed a plan for public education to include art or trade to be selected by the student. While this plan was not carried out, it shows a trend of thinking in the early colonial day.

Early American Industrial Arts. The industrial arts was adopted in many European countries and well advanced before its importance was recognized in the United States by many prominent American educational leaders. Much study of the European development was made and absorbed quickly, as well as ideas coming from the new factory system.

The earliest industrial arts training in the United States took place in the Franciscan Mission Schools in New Mexico. They taught carving, carpentry, brickmaking, and related skills that would be of benefit to Indians who inhabited the area. Similar programs were conducted by other missions in California and Florida.

The early English colonists brought some of the industrial arts ideas and methods with them to the new land. One was the apprenticeship method. The Colony of New Plymouth in 1641 adopted the English Poor Law of 1601. This gave the colony the power to apprentice the poor

children to provide them with some education. This means of education was particularly successful. Its effectiveness was increased as the town representatives were the authorities.

The First American Public School. The 1647 decision of the General Court of Massachusetts provided the means of public or free school in America. A school teacher was hired and the teacher's salary was paid by town citizens. Massachusetts is noted for its early leadership in free education for all classes of the population. The law of 1649 states: "Every township of fifty or more householders must appoint and pay the salary of a school teacher." (3, page 369) After the Revolutionary War, the Thirteen Colonies began to expand the educational establishments and facilities.

Post Revolutionary Period. In 1787 Cokesbury College in Maryland began to educate students in gardening and carpentry, as an example of early American industrial arts education. The American manual labor movement from 1825 to 1834 brought in many principles of the Fellenberg Academy for lower classes in America. The difference was that in Europe only the upper class, with money for the tuition, was admitted, and manual labor was used for physical development. The labor was used as a means of payment of tuition and living expenses in the American method. Reverend Elias Cornelius (1794-1832) combined the two aims of Fellenberg and established the Andover Theological Seminary of Andover, Massachusetts. The purpose of this school was to save the souls of boys and girls by teaching them to read the bible, and to enable them to earn an honest living. Other schools were the Oneida Institute of

Science and Industry at Whitesborough, New York, and the Manual Labor Academy at Germantown, Pennsylvania. The use of manual labor for the purpose of earning board and education as well as providing physical development, as Fellenberg stressed, was the practice of these schools.

The manual labor movement reached its highest point about 1834 and was succeeded in America by the mechanics institute movement in Great Britain during the earlier part of the nineteenth century. The first school of this type was established in 1820 by the General Society of Mechanics and Tradesmen of New York City. Another was the Franklin Institute of Philadelphia in 1834. The Lyceum Movement which had many statesmen as supporters, strove to educate those who could not be educated at the mechanics institute schools and is often referred to as a step in building the American ideal of popular education in applied science and engineering. American higher education was beginning to progress at a more rapid pace.

In 1862, the Land Grant Act, sponsored by Representative Justin S. Morrill (1810-1876) of Vermont, was passed, creating the state agricultural and mechanical colleges. These colleges brought about rapid growth in shopwork. Instruction in engineering shopwork was needed more after it was realized that graduate engineers with shopwork experience were hired in preference to engineers without this experience. When this was discovered, the new method of Russian shopwork instruction was brought in for experimentation.

Russian Influence in America. Della Vos, in 1876, exhibited at Philadelphia a method of instruction from the Moscow Imperial Technical School that created much interest among American educators. It, too,

adopted the principle of a separate shop for each unit of instruction with each student having individual work spaces and tools. The student learned the purpose, care, and use of tools by making projects direct from a working drawing. A project had to be completed before a new one could be started. Class instruction of this nature requires more than just enough knowledge to construct the project.

Calvin M. Woodard (1837-1914) of Washington University at St. Louis established the St. Louis Manual Training School in 1880. It was the beginning of manual training secondary schools in the United States with a few exceptions. The Course of Study was primarily manual training and the schools, supported at public expense, were apart from regular high schools. A major factor in getting manual training established in the regular high schools was that leading engineering schools would accept graduates from manual training high schools without examination. The school administrators began to realize the advantages of manual art in the high school programs and by 1900 there were approximately one hundred cities that had added manual arts to the general course of education. Industrial arts soon spread throughout the entire educational program, and the training of teachers was begun in Universities as well as Land Grant colleges and Normal schools to supply the demand. The next important development in the field of industrial arts education was the Smith-Hughes Act of 1917.

Industrial Arts Since 1917. The Smith-Hughes Act of 1917 started the vocational programs in the United States by federal subsidizing of the fields of agriculture, home economics, and trade and industrial education. There was some clashing of ideas and opinions between

industrial arts and vocational industrial education, as there is a close relationship and overlapping of teaching. It was thought that the predominant would absorb the weaker, but these difficulties were soon worked out and each program worked independently of the other. Industrial arts is a part of general education, whereas vocational education trains students for a definite job or for a specific occupation. They are similar, as some of the same equipment, teaching methods, and materials are used.

## Part C

## Current Viewpoints and Objectives of Industrial Arts

Industrial arts has become a part of general education through the efforts of many leaders in the field of industrial arts and general education. It has a well established place in the educational program at the present time.

Industrial Arts in General Education. The first concept of industrial arts by Russell and Bonser was largely in the terms of the elementary school level. Since that time it has been incorporated into all the grade levels, including institutions of higher learning.

Industrial arts activities are based on hand work in the elementary grades. The children get acquainted with the raw materials used in industry by making selected projects. In junior high school, industrial arts has become a part of the educational program. Activities are usually centered around making useful objects for the home. In high school, the objectives are broadened to include welding, machine shop, woodworking, automechanics and others. These courses can help in the

early selection of a vocation for students who do not plan to continue their education. Students also acquire skills, appreciations, worthwhile attitudes and preparation for trade schools and colleges.

College courses in industrial arts are primarily for training teachers. However, at the present time, students with a background of technical knowledge are much in demand by industry. Courses in industrial arts are provided for students studying to be engineers. Practical applications for engineers are taught in their regular laboratory work.

Warner's Objectives. Before writing his objectives, Warner made an extensive preliminary study to discover what objectives had been used during the past fifty years. Particular attention was given to courses of study, government bulletins, periodicals and reports from the National Education Association. He decided on a group of fifteen specific purposes, they include the concepts of:

A. Exploration
B. Educational guidance
C. Vocational guidance
D. Consumer knowledge
E. Household mechanics
F. Social habits and attitudes
G. Pre-vocational purposes
H. A degree of skill
I. The seven cardinal principles
J. Mechanical intelligence
K. Correlation with other subjects
L. Developing the "faculties"
M. Coordinating the "hand and eye"
N. Vocational training (18, page 34)

Newkirk's Objectives. Newkirk's objectives are:

> The general industrial arts content includes the basic areas of woodworking, metal working, drafting, graphic arts, ceramics, electricity, plastics, transportation, and textiles. The course is most frequently presented from grades seven through twelve; the industrial arts content is basically for

the purpose of general education and has the following eight objectives:

1. Self-expression through planning and building useful projects with tools and materials typical of modern industry.

2. Exploring aptitudes and interests in industrial work.

3. An understanding of industry, its workers, and processes.

4. Reading and making working drawings for personal use.

5. Choosing wisely the industrial products that are needed for modern living.

6. Adjusting and making minor repairs on the industrial products used around the home and community.

7. Providing craft experiences that will develop understanding and ability to work effectively with others. (15, page 44)

Wilber's Objectives. The following objectives as stated by Wilber show the relationship between industrial arts and general education.

1. To explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products, and occupations.

2. To develop recreational and avocational activities in the area of constructive work.

3. To increase an appreciation for good craftsmanship and design both in the products of modern industry and in artifacts from the material cultures of the past.

4. To increase consumer knowledges to a point where students can select, buy, use, and maintain the products of industry, intelligently.

5. To provide information about, and - also, insofar as possible - experiences in, the basic processes of many industries, in order that students may be more competent to choose a future occupation.

6. To encourage creative expression in terms of industrial materials.

7. To develop desirable social relationships such as cooperation, tolerance, leadership and followership, and tact.

8. To develop safe working practices.

9. To develop a certain amount of skill in a number of basic industrial processes. (20, pages 42-43)

Movement to the General Shop. The general shop was installed in the public schools in the early thirties. Newkirk defines the general shop as: "shops that are planned and equipped to teach two or more distinct types of shopwork at the same time under one teacher are general shops". (14, page 15)

Students have the opportunity of gaining experiences in more than one phase of shopwork, therefore enabling them to be better qualified in selecting their life's work. The advantages of the general shop as stated by Newkirk are:

1. It is well adapted to the organization of industrial arts content in the light of the general education, exploration, and guidance aims of the junior high school.

2. It permits students to be treated as individuals with due respect for their differences in interest and capacity.

3. It enables a student to discover his abilities and aptitudes through manipulation of a wide range of materials, tools and the processes that go with them.

4. It offers an economical way to gain experience in many activities.

5. It makes possible an adequate industrial arts program for the small school.

6. It stimulates the setting up of a well-planned shop and a carefully organized teaching content.

7. It increases teacher efficiency. (14, page 19)

The number of general shops has increased rapidly in the last ten

years. To be properly prepared to teach the general shop, the industrial arts teacher should have courses in drawing, foundry, electricity, sheet metal work, woodwork, plumbing, printing, forging, concrete work, automobile mechanics, finishing, and design.

## Part D

## Industrial Education for Negroes in Dallas

At the close of the Civil War, an industrial South took the place of the agricultural South. These new conditions made new demands on the worker. Untrained discounted in efficiency, and prescribed by their employers and fellow workmen, the lot of the Negroes, for a time was to be cast with unskilled labor. In order to aid Negroes in adjusting themselves more readily to skilled labor conditions there arose the industrial school, the idea of which appeared before the Civil War.

Origin of Separate Schools in Dallas. Records of Negro schools in Dallas from 1839 to 1887 are incomplete. It is known that the Second Congress of the Republic of Texas set aside land for the support of the schools. The Negroes never had been given any opportunity for instruction. The Constitution of 1869 required, for the first time, a uniform system of public free schools for the gratuitous instruction of all the inhabitants between the ages of six and eighteen. The Constitution of 1876 definitely separated the schools for the two races, but made impartial provisions for the education of each. As soon as the present system was established, the Negro children shared in the annual appropriations, and schools have been regularly conducted by Negro teachers down to the present time. Dallas took advantage of this provision in

the colored children attended, this being their first experience of public education. While the strong aversion to education continued, the majority of the people had become reconciled and acknowledged their right to an equitable distribution of educational means just as far as they were able to profit by them. In certain instances, contributions of certain foundations were called upon for financial assistance. One of these, the John F. Slater fund, had been employed chiefly to assist in preparing teachers and to stimulate industrial training.

The Anna Jeanes Foundation is another of these organizations which helped to promote growth of Negro schools. The teachers under the Jeanes plan introduced some forms of industrial arts into negro schools.

The Establishment of Prairie View A. and M. College. Prairie View Agricultural and Mechanical College was the first institution of higher education for Negroes to be established by the state. The Texas Legislature, in regular session, April 18 - August 21, 1876, enacted a law effective August 14, 1876, establishing an agricultural and mechanical college for the benefit of colored youth. (8, page 362) A sum of twenty thousand dollars was appropriated to locate, erect, furnish and operate a state college in accordance with the plans and specifications. The school was established in Waller County for the preparation and training of colored teachers. In 1899 the legislature changed the name of the normal school to Prairie View State Normal and Industrial College. An agricultural and mechanical department was added for men and an industrial department for women. The law also made minor changes in the method of appointment of scholarship students in senatorial and representative districts, including special requirements governing the cost

of board, lodging and instruction.

Training of Industrial Arts Teachers. Questionnaires were sent to ten industrial arts teachers in the Dallas independent school system from which the writer received one hundred percent response. Of these, seven have Bachelor of Science degrees only. Two hold Master of Science degrees and one has a Master of Arts degree. Eight of these degrees are from Prairie View Agricultural and Mechanical College.

Table I is prepared in this report to show other information concerning the training of industrial arts teachers. The writer feels that it is necessary to show the number of industrial arts teachers actually trained in the field of industrial arts who are teaching these courses.

TABLE I

COLLEGE TRAINING OF THE INDUSTRIAL ARTS TEACHERS OF THE DALLAS SEPARATE SCHOOLS

| | Number of Teachers | Percentage of Total |
|---|---|---|
| Number of Bachelor Degrees | 10 | 100 |
| Number of Master Degrees | 3 | 30 |
| Number Finishing Prairie View | 8 | 80 |
| Number Attending Other Schools | 2 | 20 |
| Number Majoring in Industrial Arts | 9 | 90 |
| Number Majoring in Other Fields | 1 | 10 |

Vocational Education in Separate Schools. State funds for vocational education were made available for use in the separate schools under the Smith-Hughes Act (1917) and the George-Dean Act (1937). Under the

provisions of these acts, state funds were to be supplemented by federal funds and a portion of these funds was to be allotted to Negro schools on the basis of the number of students enrolled in vocational education courses. Vocational education became a regular part of the school program in 1921 under the provisions of the Smith-Hughes Act. Dallas has since set an example for other cities in the equitable distribution of federal funds between the race groups in all phases of vocational education.

Present Status of Negro Education in Dallas. The growth of the separate school in Dallas has been quite remarkable in the last five decades. By 1956-57, Negro school attendance had increased from a mere handful in 1900 to 30,000 and there were three accredited high schools in the city. This was an increase of two high schools in the past seventeen years. In several respects the growth and development of the secondary school system furnish the best index of progress for any people. This has resulted in increased enrollment, better buildings, more competent teachers, more and better equipment and more desirable recreational units. The three Negro high schools are accredited by the Southern Association of Secondary Schools and Colleges.

All of this has added prestige to the realm of Negro education in Dallas. Higher education in all fields is being made available to Negroes in the state. Until recently, it was necessary for Negro students to go outside of the state for graduate and professional training. Expanded facilities, highly trained teachers and administrators, and higher standards of achievement make for an encouraging outlook in the field of Negro education in Dallas.

# CHAPTER III

## THE SURVEY

In order to plan a program for the separate high school shops, it was necessary to obtain certain information from the schools now in existence. As was stated in Chapter I, this information was obtained by questionnaire and personal interview. A two-page questionnaire was prepared and mimeographed for mailing. The separate high schools which have industrial arts included in their curricula were visited and the shop teachers interviewed. This was followed up by mailing a questionnaire and letter to each shop teacher in the separate schools of the Dallas Independent School District.

The Questionnaire. The purpose of this study was to determine the type of program now in existence in separate school shops in Dallas. The questionnaire was divided into five parts: (1) The curriculum, (2) The teaching schedule, (3) The shop, (4) Training of teachers, and (5) Equipment. The first page of the questionnaire consists of questions about the shop size and location, and teaching methods, techniques and aids. A table is included on which the teaching schedule is listed. The second part of page one contains additional questions on teaching methods, a table to show the training of shop teachers, and a check list for listing shop equipment. The continuation of the check list on page one is found on page two. The data as compiled from the information contained in the questionnaire will provide the discussion for the

remainder of this chapter.

Distribution of the Questionnaire. These questionnaires were mailed to three separate high schools, as shown in Table II, below. Each was accompanied by a personal letter explaining the purpose of the survey. A copy of the questionnaire and the letter of accompaniment are to be found in Appendix B of this report. Five answers were received at the start. Later, a follow-up letter was mailed to each shop teacher to which questionnaires were mailed. Five additional replies were received. This made a total of ten answers. Table II shows the school shops to which questionnaires were mailed.

TABLE II

SEPARATE SCHOOLS IN DALLAS WHICH OFFER INDUSTRIAL ARTS

| School | Location | Enrollment |
|---|---|---|
| Booker T. Washington | North Dallas | 1725 |
| James Madison High | South Dallas | 2200 |
| Lincoln High | South East Dallas | 1500 |

Talking with individual teachers provided more information and made it possible to receive the necessary data asked for on the questionnaire.

The Curriculum. "Does the shop have a library?" To this question, six replied "yes", two said "no". Two did not reply. Of the six shops with libraries, the number of books ranged from ten to fifty.

"What visual aids are used?" The answer received indicated that

sixteen millimeter movie projectors are used in all the shops. The projectors are used to show films dealing with wood and furniture design, mechanical drawing, automobile mechanics, metal and electrical work. Film strip projectors are used in four shop classrooms. Five shops list standard charts, posters and mock-ups as visual aids.

To the question dealing with methods used to assign projects, ten answered that both methods were used with projects being assigned by the teacher in the lower grades and chosen by the students in the upper grades. Various comments were made on this question. One instructor finds that allowing free choice stimulates interest in the work. A second instructor permits free choice only if the project meets home needs.

"Is the course designed for general education? Vocational education? Or both?" Eight teachers answered that the courses taught were designed for general education. One replied that the course was designed for vocational education. Two have courses designed for both.

When asked to indicate the methods used for teaching shop classes, three indicated lecture method, four used demonstration, one used class discussion and two use question and answer methods. Of these numbers, six teachers were found to use all four methods. The four others used one, two or three of the methods suggested.

"How is student achievement measured?" This question brought a variety of responses. One instructor stated that practice and testing were used as standards of measurement. Four teachers listed evaluation and testing as a measure of achievement. Other qualities listed were: production, application, attendance, speed, accuracy, tool manipulation, quality of finished product, and measuring up to a pre-determined standard.

The next question asked that the teachers indicate whether or not job sheets, work sheets and course outlines were used. Four teachers indicated the use of job sheets in their work. Course outlines were used by six teachers. Three teachers indicated the use of all three.

"Are unit tests given? Final examinations?" Six teachers replied "Yes" to the question on unit tests. On final examinations, ten replied yes. Final examinations are required in the Dallas Independent School District.

"Does the shop program meet local needs?" Only seven teachers felt that their programs did meet local needs. One said the program in use did not. Two answered, "partly". When asked how this was determined, two answered by observation of job opportunities. One answered by stating it gives the student an understanding and an appreciation of the basic principles that are used in industry. Seven respondents who answered yes failed to give the reason for this answer. The one who replied "No" based his determination on a comparison of the training the students are receiving with what he thought they should receive. The respondents who replied "partly", said the whole community needed vocational guidance.

Data About Separate High Schools. Some explanation is necessary to account for the answers used in the tables. The writer learned through interview with the shop instructors that teachers are often reluctant to reveal the incompleteness of equipment in their shops. It is believed that sending of the questionnaire to the shop teachers had some bearing on the excellent response. The writer did this for two reasons. First, teachers were thought to devote more time and interest

to such matters. Second, along with personal interview the teachers were more willing to cooperate with the survey. The data contained in this chapter are based on compilations resulting from analysis and interpretation of the ten questionnaires.

The Shop. The total number of high schools used in Table II is three. Of this number, two are a part of the main building, one has a separate building. All of these shops are located on the first floor. The average sizes of the shops are approximately 35 feet wide by 80 feet long with 14 feet ceiling heights. This gives an average floor space of 2800 square feet.

Teaching Schedule. Five of the shops in the survey offer woodwork as shop training. Five others offer electricity, automobile mechanics, radio, general metal, mechanical drawing and drafting. Table III, page 31, shows the number of shops offering each course listed. Course listings were taken from answers given in the questionnaire. Enrollment in the woodworking classes numbered 481 which is the largest enrollment of students in any particular shop area.

The third column of the table shows the number of hours per day that these shops are open for instruction in the subjects listed. For woodworking the text books listed were Instructional Units in Hand Woodworking, by Douglass and Roberts; Advanced Wood and Furniture Making, by Feier; Hand Woodworking, by Hunt and Tate; and Principles of Woodworking, by Herman Hjorth.

TABLE III

STUDENT ENROLLMENT IN SHOP COURSES

| TYPE OF COURSE | NO. OF BOYS | NO. OF SHOPS | NO. OF HRS PER DAY |
|---|---|---|---|
| Woodwork | 481 | 4 | 14 |
| Electrical | 38 | 1 | 1 |
| Automobile Mechanics | 91 | 1 | 5 |
| Radio | 21 | 1 | 1 |
| General Metal | 136 | 2 | 5 |
| Mechanical Drawing | 267 | 3 | 11 |
| Architectural Drafting | 40 | 1 | 2 |
| Total Number of Boys | 1074 | | |

Equipment. Table IV, page 32, has been prepared to show the number of machines, the average size of machines and the number of shops having a particular type of machine. They did not vary, due to the fact, that all the shops are equipped by the same coordinator in this school district. Since woodworking and drawing are taught more extensively in the shops, most of the equipment listed were in these departments. The wood turning lathe was the machine found most often in the shops. The jointer and jig saw were next in incidence.

Letters Received. In all cases letters accompanied the returning forms expressing the writer's desire to be informed of the survey findings. This invitation was extended to all in the letter of transmittal which accompanied the questionnaire. The writer believes personal

TABLE IV

EQUIPMENT IN SEPARATE SHOPS

| Name of Machines | No. of Machines | Average Size | No. of Shops |
|---|---|---|---|
| Variety saw | 1 | 12" | 1 |
| Universal saw | 2 | 12" | 2 |
| Band saw | 3 | 20'6" | 3 |
| Jig saw | 7 | 8" | 4 |
| Jointers | 3 | 8" | 3 |
| Drill press | 7 | ½" capacity | 6 |
| Shaper | 3 | 42" table | 3 |
| Surfacer | - | - | - |
| Belt sander | 2 | 24" | 2 |
| Glue pot | 5 | small | 4 |
| Power grinder | 8 | 36" | 3 |
| Saw filing machine | - | - | - |
| Wood turning lathes | 8 | 36" | 3 |
| Benches | 61 | 22x33x52 | 7 |
| Mortiser | 2 | ½" capacity | 2 |
| Portable sander | 4 | 12" | 3 |
| Drawing Boards | 100 | 22x30 | 3 |
| T-squares | 110 | 26" | 3 |
| Stools | 100 | 26" | 3 |
| Drawing tables | 99 | 31x36 | 3 |
| Drawing sets | 60 | 10 pcs | 3 |
| Radio | 5 | 5 tube set | 1 |
| Telephone | 2 | standard | 1 |
| Blow torch | 1 | regular | 1 |
| Transformer | - | - | - |
| Electric lift | 1 | standard | 1 |
| Electric meter | - | - | - |
| Volt meter | 6 | assorted sizes | 2 |
| Angle braces | 1 | | 1 |
| Battery charger | 1 | 6-12 volt capacity | 1 |
| Auto jacks | 2 | 2½x4x10 | 1 |
| Universal testing device | - | - | - |
| Forming roll | 2 | 42" | 2 |
| Bar roll | 3 | 42" | 2 |
| Stake plate | 7 | - | 2 |
| Hollow mandrel | 2 | 16" | 2 |
| Soldering furnace | 5 | small | 2 |
| Squaring shears | 2 | 8" | 2 |
| Pan break | 2 | medium | 2 |
| Bench grinder | 1 | 11" | 1 |
| Buffing wheel | 1 | 8" | 1 |

contact had much to do with the over-all cooperation of all the shop teachers surveyed.

Summary. Of the ten shops surveyed in this report, ten replies were received. The questionnaire was more or less completely filled out in the various shop areas. The number of students enrolled in shop classes ranged from 14 to 39. The variations in shop sizes caused this reflection of differences. Industrial arts as it is taught in the schools in the survey will prepare students to perform minor repair tasks and build small articles. The limitations placed on the programs being offered by lack of equipment and inadequacy of facilities fail to prepare students for competition. In most communities, boys who have had training in a specific skill find employment easier to get.

The answers received show that industrial arts does not receive sufficient stress in the schools. If the industrial arts departments in the secondary schools are to teach industrial processes to the children, and if industry continues to find new ways and methods of producing products, the shop teachers will have to put more stress on industrial arts. The writer believes this lack of stress is perhaps due to insufficient equipment and over-loaded teaching schedules. Most shops were large and poorly equipped.

Having completed the tabulation and interpretation of data by the use of the questionnaire and personal interview the writer will undertake the proposal of a program for the Separate Schools of Dallas. This plan will be presented in Chapter IV of this study.

# CHAPTER IV

## THE PROPOSED INDUSTRIAL ARTS PROGRAM FOR THE SEPARATE SCHOOLS OF DALLAS

The courses contained in this chapter proposed a program of activities for the general shop. The type of training included will be determined by local condition, by the data obtained from survey and by the writer's experiences in industrial arts training. In formulating this program it is to be remembered that industrial arts is a part of general education. It was conceived as an answer to the problem of educating boys to live in a world which may be accurately characterized as industrial and technological.

Shop Training. In the proposed program for the separate schools, the school is organized on the 8-4 plan and the class periods are fifty minutes in length. The first two years are to be devoted to general training in all units of the proposed courses. Upon completion of two years of general training, each boy, with the guidance of the instructor, will elect the unit of his choice. During the remainder of his stay in high school the student will be given specific training under actual working conditions in his chosen field. This is not a program of trade training, but rather an exploratory course designed to expose the student to fundamental objectives of industrial arts and to bring out his hidden skills.

During the first training period in the school shop, one hour each day should be spent in shop class work. It is recommended that two

hours each day be spent in industrial arts subjects for advanced classes.

Selected Courses of Study. Before one can develop an effective shop program, consideration must be given to the number of subjects and their importance in the community. The course of study is designed to be of benefit to both, student and instructor. It is to be used as a progress chart. When a student has completed one assignment, it will be presented for approval of the instructor and that unit checked off in the space at the right of the course outline. The courses of study are taken from the bulletin, Improving Instruction in Industrial Arts, published by the American Vocational Association Committee, Homer J. Smith, Chairman. These courses of study are presented in outline form. (21, page 18)

Course of Study in Woodwork. Woodworking, as it is generally taught, consists of learning about lumbering, use of hand and machine tools, and orderly procedure in making a project. Every shop program should include woodwork in its curriculum, for woodworking is one of the basic shop courses, and it offers training which is useful in almost any line of work that the student might pursue. One would not expect the shop training program to train boys qualified to fill positions as skilled cabinet makers or carpenters, but one should expect boys to receive general training in the use of various machines and tools which would be of benefit to the student, whether or not he chooses to follow woodworking as an occupation.

Woodworking courses have commonly been too narrow in school shops. The experiences provided have not given contact with a sufficient variety of materials and exploratory experiences have not always been made

available. The following program is proposed to meet these requirements.

A. Things Pupils Should Learn to Do

1. Read a working drawing .....
2. Make out a bill of materials .....
3. Plan a procedure in doing a job .....
4. Check materials when received .....
5. Measure and divide spaces with a rule .....
6. Lay out a pattern on stock .....
7. Check the layout .....
8. Lay out curves with dividers or compasses .....
9. Gage with a marking gage .....
10. Test for squareness with the try square .....
11. Lay out square cuts with the try square .....
12. Adjust a jack plane .....
13. Plane a surface true .....
14. Plane an edge square with an adjoining surface .....
15. Plane end grain .....
16. Proceed properly in squaring up a board .....
17. Saw to a line with a cross cut or rip saw .....
18. Saw to a line with a back saw .....
19. Saw inside or outside curves with a coping saw .....
20. Round edges .....
21. Finish outside curves .....
22. Finish inside curves .....
23. Drill holes in wood .....
24. Bore holes in wood .....
25. Fasten with screws .....
26. Trim or pare with a chisel .....
27. Smooth a surface with sandpaper .....
28. Shape ends, edges, and curves with a wood-file .....
29. Drive and draw nails .....
30. Set a nail or brad .....
31. Lay out and test cuts with a sliding T bevel .....
32. Round or form work with a spoke shave .....
33. Lay out an octagon and a chamfer .....
34. Hold stock with hand screws and clamps .....
35. Apply stain, wax and enamel .....
36. Clean and care for stain and shellac brushes .....
37. Apply fillers and shellac .....
38. Transfer a design .....
39. Make a butt-joint .....
40. Lay out irregular designs by means of squares .....
41. Sharpen edge tools .....
42. Keep tools free from rust .....
43. Prepare glue .....
44. Glue up work .....
45. Lay out duplicate parts .....

46. Apply paint with a brush .....
47. Clean and care for paint brushes .....
48. Lay out and cut a dado and a cross-lap joint .....
49. Cut a groove and a rabbet .....
50. Make an edge-to-edge joint .....
51. Lay out and cut tapers .....
52. Do upholstering that involves simple padding .....
53. Dress a screw driver .....
54. Set and use an expansive bit .....
55. Put on locks and drawer pulls .....
56. Put on hinges and ball catches .....
57. Apply varnish .....
58. Apply lacquer .....
59. Clean and care for varnish and lacquer brushes .....
60. Apply finish with a spray-gun .....
61. Clean and care for a spray-gun .....
62. Lay out and cut miter joint .....
63. Construct a panel .....
64. Make a splined-joint .....
65. Make a drawer-slide .....
66. Fasten on a table top .....
67. Cut an edge mold .....
68. Sharpen auger-bits, scrapers and saws .....
69. Use a forstner bit .....
70. Lay out and cut blind mortise-and tenon joint .....
71. Do simple upholstering that involves the use of springs.
72. Do simple upholstering that involves webbing and rolled edges .....

B. Things Pupils Should Know

1. Identify the following kinds of lumber and other kinds of lumber in common use in the community: the pines, spruce, cypress, oak, walnut, birch, maple, poplar, mahogany, red cedar, hickory, gum, and chestnut .....
2. The principle characteristics of lumber, the working qualities, principal uses, and the source of supply ....
3. The methods of cutting and milling lumber .....
4. How lumber is dried, effect of moisture .....
5. How veneers and plywood are made, their uses .....
6. The nominal and actual dimensions of lumber .....
7. Kinds of finishes in common use, such as stain, oil, wax, shellac, varnish, enamel and paints .....
8. The object of finishes .....
9. The durability of the different finishes .....
10. The conditions or places in which various kinds of finishes may be used .....
11. Materials from which finishes are made .....
12. Kinds of glue, and preparation of same .....
13. Conditions and requirements of uses of glue .....
14. Kinds of nails and their uses .....

15. Size of nails and how nails are sold ..... ____
16. Kinds of screws and their use ..... ____
17. How sizes and kinds of screws are indicated ..... ____
18. Kinds, grades and principal use of sandpaper ..... ____
19. Grades and uses of steel wool ..... ____
20. Develop fair judgment concerning the design of furniture with regard to the following: Is it adapted to the use for which it is intended? Is it structurally good? Is it well made? Are the structural members in good proportion? Does it have an appearance of stability? Is the structure well and appropriately finished? ..... ____
21. The locations of important manufacturing concerns ..... ____
22. The division of labor ..... ____
23. The use of automatic machinery ..... ____
24. Types of joints, where used and why ..... ____
25. Types of hinges and their uses..... ____
26. Types of latches and where used ..... ____
27. Types of locks and where used ..... ____
28. Special types of fittings ..... ____
29. Kinds of grinding and sharpening stones, their grades and uses ..... ____
30. Opportunities and requirements in carpentry and other woodworking trades ..... ____

Course of Study in Electrical Work. The study of electricity is a very important subject both, from the standpoint of its use in the home and from the standpoint of vocational opportunities. The industrial arts shops cannot cover all of the phases of industry, but may give the elementary theory and enough practice to enable the students to get a fairly clear picture of the electrical industries.

The field of electricity is so vast, and its applications in practice so extensive and so intricate, that only a small part of it can be considered in listing units for the purpose of teaching. There are, however, certain fundamental conceptions and practical phases that may be presented with profit to high school ages. To go beyond these would suggest specialized vocational training.

A. Things Pupils Should Learn to Do

1. Read a wiring diagram ..... ____
2. Make a wiring diagram ..... ____
3. Plan a procedure for doing a job ..... ____
4. Make a rat-tail splice ..... ____
5. Make a Western Union splice ..... ____
6. Make a tap splice ..... ____
7. Remove insulation or covering from wire ..... ____
8. Solder and tape a splice ..... ____
9. Attach wire to a binding post ..... ____
10. Uncoil wire without twisting ..... ____
11. Connect dry-cells in series and in parallel ..... ____
12. Plan and construct a simple electric circuit ..... ____
13. Plan and install electric devices in a circuit in series and in parallel ..... ____
14. Plan and construct circuits to give selective control of devices in the circuit ..... ____
15. Attach a cord to a lamp-socket ..... ____
16. Attach a cord to a plug ..... ____
17. Test and replace fuses ..... ____
18. Read an electric meter ..... ____
19. Interpret the identity marks on a motor ..... ____
20. Administer first aid in case of shock ..... ____
21. Attach a terminal to a wire ..... ____
22. Provide a "make and break" in a circuit ..... ____
23. Apply the principle of electro-magnetic force in order to operate mechanisms as in a buzzer ..... ____
24. Employ resistance to generate heat ..... ____
25. Reduce voltage on line ..... ____
26. Locate a break in a circuit ..... ____
27. Tie an underwriter's knot ..... ____
28. Calculate the resistance of a circuit ..... ____
29. Install a snap-switch, flush-switch and flush-receptacle ____
30. Measure voltage and amperage ..... ____
31. Wire a circuit so as to prevent a dangerous rise in temperature, due to resistance ..... ____

B. Things Pupils Should Know

1. Properties of the magnet and characteristics of the magnetic field ..... ____
2. Source of electric current or pressure ..... ____
3. The characteristics of the electric current ..... ____
4. How electric current is conveyed ..... ____
5. The kinds of conductors and their uses ..... ____
6. The meaning of volt, ampere and watt ..... ____
7. How electric current gives power, light, and heat ..... ____
8. The difference between direct and alternating current .. ____
9. Sources of direct and alternating current ..... ____
10. The meaning of phase and cycle ..... ____

11. The meaning of "series" and "parallel" and the difference between the effects of these connections ..... ____
12. Resistance and its effect ..... ____
13. Ohm's law ..... ____
14. How the electric bell works ..... ____
15. Why splices should be soldered ..... ____
16. The importance of proper insulation ..... ____
17. The sizes of wire ..... ____
18. The effect of an overload ..... ____
19. Symbols used in wiring diagrams ..... ____
20. Safety rules in working with electricity ..... ____
21. How the rheostat, volt-meter, and ammeter work ..... ____
22. Construction and operation of the wet and dry cell battery ..... ____
23. Kinds of fuses and their uses ..... ____
24. How the electric meter works ..... ____

Course of Study in Automobile Mechanics. The automobile is perhaps more widely used than any other machine. For this reason, it is important that people know something of the principle upon which it operates in order that it may be used with greater satisfaction. The primary purpose of high school courses in automechanics is not to give vocational preparation but, rather, to teach the mechanical principles involved in many machines including the automobile. If people are to be taught to use and care for automobiles intelligently, the instruction must be specific and systematic. The shop equipment used for this instruction must be sufficient and of proper character.

The list of learning units given here is not a list of the repairs a boy should be able to make, but a list of the experiences he should have in order that he may understand some of the fundamental principles of machines, how to care for machines and how to make minor repairs and adjustments.

A. Things Pupils Should Learn to Do

1. Plan the procedure in doing a job ..... ____
2. Test and clean spark-plugs ..... ____
3. Clean and adjust breaker points ..... ____
4. Grease a car and change oil in the engine ..... ____
5. Wash and polish a car ..... ____
6. Clean gasoline lines ..... ____
7. Replace light bulbs ..... ____
8. Remove sediment from the radiator ..... ____
9. Test and care for the battery ..... ____
10. Remove and replace a tire ..... ____
11. Adjust tension on a fan or generator belt ..... ____
12. Repair punctures with hot and cold patches ..... ____
13. Insert a boot in a casing ..... ____
14. Grind valves ..... ____
15. Trace lines of power from engine to wheel ..... ____
16. Adjust the charging rate in a generator ..... ____
17. Clean the commutator ..... ____
18. Iron out dents or bends in fenders or body ..... ____
19. Retouch scratches or damage to the finish ..... ____
20. Align the front wheels ..... ____
21. Adjust mechanical brakes ..... ____
22. Trace lines of power from battery to engine ..... ____
23. Trace lines of power from engine to generator ..... ____
24. Trace lines of power from engine to distributor ..... ____
25. Trace electric circuit from generator to battery ..... ____
26. Inspect a vacuum tank and fuel pump ..... ____
27. Trace and test the lighting system ..... ____
28. Test, focus, and adjust lights ..... ____
29. Inspect and adjust front wheel bearing ..... ____
30. Test for and correct lost motion in steering mechanism ____
31. Inspect and adjust clutch and differential ..... ____
32. Adjust hydraulic brakes and main bearings ..... ____
33. Adjust connecting rod bearings ..... ____
34. Scrape a bearing ..... ____
35. Clean and adjust the carburetor ..... ____
36. Trace and test the ignition system ..... ____
37. Locate and repair a short or open circuit ..... ____
38. Test an ignition coil ..... ____
39. Time valves ..... ____
40. Adjust valve clearances in L head and valve in head engines ..... ____

B. Things Pupils Should Know

1. Types and uses of anti-friction bearings ..... ____
2. What is meant by camber, caster, and toe-in and how they affect car operation ..... ____
3. Principle of the worm-gear and how applied to steering gear ..... ____

4. How the cam-and-lever type of steering gear works ..... ____
5. The different types of brakes and axles ..... ____
6. Types of engine bearings and reasons for use ..... ____
7. Kinds of pistons and types of rings ..... ____
8. How the fuel pump works ..... ____
9. Purpose of the carburetor and how it works ..... ____
10. Necessity and method of proper lubrication ..... ____
11. Safety precautions of driving ..... ____
12. Types of clutches and how they work ..... ____
13. The universal joint and how it works ..... ____
14. How the gear-shift transmission works ..... ____
15. How the automatic transmission works ..... ____
16. How the free wheeling device works ..... ____
17. How the differential works ..... ____
18. Meaning of gear ratio and effect on power and speed ... ____
19. How fluid drive works ..... ____
20. How starting, lighting and ignition systems work ..... ____
21. How the over-drive mechanism works ..... ____
22. The meaning of cycle in a gas engine ..... ____
23. How the gas pump works ..... ____

Course of Study in General Metalwork. Metal working is an important field of instruction in the industrial arts curriculum. The manipulative processes of general metalwork consist mainly of cutting, shaping, forming and jointing thin metals with hand tools or any work with metals that may be manipulated while cold. The uses of sheet metal are many and varied and the students should be taught the correct uses so that they may be able to judge quality and durability. The students will learn about construction of furniture and the various finishes that are used in the industries today. The writer feels that this type activity will prove useful in meeting the objective of this course if effective methods are employed in teaching.

A. Things Pupils Should Learn to Do

1. Make out a bill of materials ..... ____
2. Check material when received ..... ____
3. Plan the procedure for doing a job ..... ____
4. Transfer patterns to sheet metal ..... ____
5. Cut with tinner's snips ..... ____

6. Solder tin, copper, brass and galvanized iron ..... ____
7. Sweat and rivet joints ..... ____
8. Light and operate a blow-torch ..... ____
9. Trim with squaring shears ..... ____
10. Form by hand and with bar folder ..... ____
11. Turn edges for a hem ..... ____
12. Hold a curved edge ..... ____
13. Punch holes with solid and hollow punch ..... ____
14. Raise or bump sheet metal forms ..... ____
15. Roll a sheet on a forming machine ..... ____
16. Wire edges on a wiring machine ..... ____
17. Wire edges with a bar-folder and a hammer ..... ____
18. Turn a lock seam ..... ____
19. Groove with a hand groover ..... ____
20. Burr with a machine ..... ____
21. Make a setting-down seam on a machine ..... ____
22. Double seam at bottom ..... ____
23. Use the square stake and the hatchet in forming ..... ____
24. Drill holes in metal ..... ____
25. Use a cold-chisel and a hand-swage ..... ____
26. Stretch metal with hammer for flange or joint ..... ____
27. Braze with hard solder ..... ____
28. Prepare cut acid flux ..... ____
29. Anneal with copper or brass ..... ____
30. Give hammer finish to copper, brass or iron ..... ____
31. Apply lacquer finish ..... ____
32. Color and etch on copper or brass ..... ____
33. Clean copper with acid ..... ____
34. Use a file, back-saw, and taps and dies ..... ____
35. Bend, twist, and form wire ..... ____
36. Bend, twist, and form strap-iron ..... ____
37. Develop patterns ..... ____
38. Lay out patterns for scrolls ..... ____
39. Bend bars or strap-iron into scrolls ..... ____
40. Drill with a power drill ..... ____
41. Twist iron bar for ornamental shapes ..... ____
42. Give a durable black finish ..... ____
43. Cut threads and tap holes ..... ____
44. Draw out hot metal ..... ____
45. Temper small tools ..... ____
46. Tin a soldering-copper ..... ____

B. <u>Things Pupils Should Know</u>

1. The kinds of solder and their uses ..... ____
2. Kinds and uses of fluxes and dipping solutions ..... ____
3. Names of tools, equipment and operations in a general metal shop ..... ____
4. How to care for tools and equipment ..... ____
5. How to identify kinds of metal ..... ____
6. The gages of sheet-metal ..... ____

7. The standard sizes of soft iron wire ..... ____
8. Sources and characteristics of tin ..... ____
9. Methods of manufacturing tin-plate ..... ____
10. Commercial sizes of tin-plate ..... ____
11. The manufacture of galvanized iron, its grades and qualities ..... ____
12. Sources, uses, and characteristics of copper ..... ____
13. Composition, characteristics and uses of brass ..... ____
14. Sources, characteristics and uses of zinc and aluminum ____
15. The principal kinds of steel ..... ____
16. The manufacture of steel ..... ____
17. Kinds and sizes of drills and rivets ..... ____
18. How to specify grades of tin-plate and galvanized iron ____
19. Occupational information ..... ____

Course of Study in Mechanical Drawing. The term "mechanical drawing" is properly applied to work involving the use of instruments. Mechanical drawing develops the power of visualization, trains in exactness of thought and, if taken to a higher degree, teaches the student to read and write the language of the industries. The manipulative phase of drawing is the skillful rendering of the solutions of problems. Such skills can be acquired only through careful and painstaking practice. These skills must be accompanied by the knowledge and ability to solve problems to be of greatest benefit.

A. Things Pupils Should Learn to Do

1. Fasten drawing paper on drawing board ..... ____
2. Sharpen drawing pencils ..... ____
3. Measure with the scale ..... ____
4. Mark points with a pencil ..... ____
5. Choose the necessary views of an object ..... ____
6. Sketch lines and make a working sheet ..... ____
7. Draw vertical and horizontal lines ..... ____
8. Draw parallel lines ..... ____
9. Clean and care for drawing instruments ..... ____
10. Keep drawing and drawing table neat ..... ____
11. Draw, and know uses of, different kinds of lines ..... ____
12. Erase pencil lines ..... ____
13. Block out views ..... ____
14. Make front, top and side views with a knowledge of their relationship ..... ____

15. Pencil a drawing in correct order ..... ____
16. Draw views with hidden edges ..... ____
17. Dimension a drawing ..... ____
18. Sharpen and adjust a compass lead ..... ____
19. Draw arcs and circles ..... ____
20. Make arrow heads ..... ____
21. Make numerals and lay out a title ..... ____
22. Letter upper-case letters ..... ____
23. Make a drawing to scale and check ..... ____
24. Draw sectional views of an object ..... ____
25. Make an auxiliary view ..... ____
26. Letter notes and specifications ..... ____
27. Transfer measurements ..... ____
28. Divide a line into a given number of equal parts ..... ____
29. Draw floor-plans, octagons, hexagons, simple graphs, machine parts, ellipses, and irregular curves ..... ____
30. Ink straight lines ..... ____
31. Ink arcs and circles ..... ____
32. Ink a drawing in proper order ..... ____
33. Erase an ink line or an ink spot ..... ____
34. Make a blueprint ..... ____
35. Measure with outside and inside calipers ..... ____
36. Bisect arcs and angles ..... ____
37. Draw bolts with conventional threads ..... ____
38. Dress dividers, ruling pens and compass pens ..... ____
39. Make a detail drawing ..... ____
40. Make an assembly drawing ..... ____
41. Make a tracing on cloth and on paper ..... ____
42. Determine the true length of a line ..... ____
43. Draw the development of square, prism-shaped objects .. ____
44. Make isometric and oblique drawing ..... ____

B. <u>Things Pupils Should Know</u>

1. Kinds of scales used in measuring and for what class of work each is used ..... ____
2. Names and uses of drafting instruments and how to care for them ..... ____
3. Sizes of triangles and T-squares and how designated ... ____
4. How to select and care for a drawing board ..... ____
5. How to arrange lighting to protect the eyes ..... ____
6. Kinds and qualities of drawing paper ..... ____
7. Various kinds of pens and their uses ..... ____
8. The kind of ink used in drafting ..... ____
9. How to select and test T-squares and triangles ..... ____
10. Qualities and uses of tracing paper and tracing cloth . ____
11. How to select and care for blue print paper ..... ____
12. Kinds of pens best suited for lettering ..... ____
13. Conventional ways of representing breaks in materials . ____
14. Occupational information, including success factors, income and opportunities ..... ____
15. How to read contour maps ..... ____

Conclusions. The purpose of this chapter has been to design courses of study for the separate schools of Dallas. One would expect the shop training program to train boys to receive general training in the use of various machines and tools which would be of benefit to the student, whether or not he chooses to follow the course as an occupation. The next chapter is devoted to the shop building and equipment of the industrial arts program for the separate schools of Dallas.

# CHAPTER V

## THE SHOP BUILDING AND EQUIPMENT

Survey findings, observation of industrial arts shops in the separate schools of Dallas, and interviews with the shop teachers in the school shops, have revealed to the writer inadequacies which are outstanding in certain features of the industrial arts programs in the separate schools. These factors have been taken into consideration in planning the shop building and in listing the equipment.

The Shop as it Now Exists. At this time, the separate school shops are inadequate. So few machines are provided, that it is doubtful if they will provide a suitable program. In two schools the shops are a part of the main building which are equipped to house a woodworking program only. In many instances the proper number of tools are not available and those on hand are in poor condition. The shops are equipped with one band saw, one jig saw, one drill press, one jointer and one wood turning lathe. Most of these are in fair to poor condition.

Specific Needs of the Separate School. The separate school shop has a peculiar problem facing it in regard to the needs of the students. This problem concerns two groups who look to the high school for training. One group will go to college, the other will go into competitive participation in jobs that are available. The school shop program must be based on job opportunities offered by the community in order to

meet this need. These problems and others which were discussed in the first chapter of this report have brought to the attention of the writer the need for a more complete industrial arts program for the separate schools. Suggestions for the solution of these problems are in the form of a general shop program and the equipment needed for its operation.

The Proposed Plan. Any proposed shop plan should be preceded with a schedule of areas of instruction for that particular shop. Table V has been prepared to show the schedule of training for the general shop program. These students, enrolled in general shop two semesters (a complete school year), will pursue the following schedule:

TABLE V

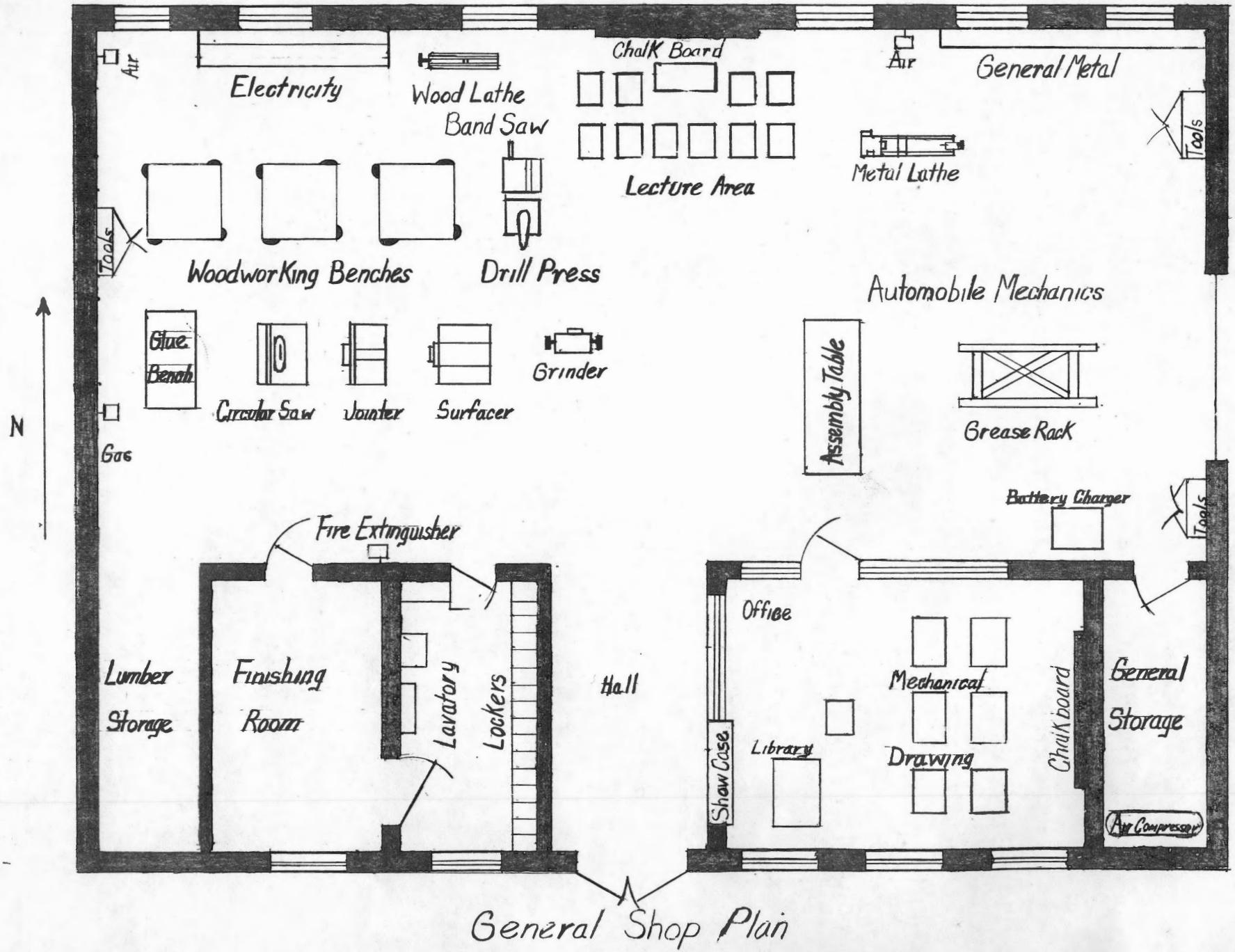
SCHEDULE OF TRAINING

| Courses | Six-Week Periods | | | | | |
|---|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | 5th | 6th |
| Drawing | A | F | E | D | C | B |
| Woodworking | B | A | F | E | D | C |
| Woodworking | C | B | A | F | E | D |
| Electricity | D | C | B | A | F | E |
| Metalwork | E | D | C | B | A | F |
| Automobile Mechanics | F | E | D | C | B | A |
| 36 Weeks | Class divisions rotate every six weeks. | | | | | |

Electricity, general metal, mechanical drawing, automobile mechanics and woodworking will be offered to the ninth and tenth grades for

the whole year. Woodworking will be required for twelve weeks for all boys. The students will be rotated through the areas of instruction by class divisions lettered from A through F. Each division will remain in woodwork for twelve consecutive weeks, with the exception of the "C" division. The classes are based upon twenty-four students rotating at six week intervals for thirty-six weeks. Upon completion of the general shop training a student may be allowed to specialize in some particular phase of industrial arts by enrolling in a technical high school.

The floor plan for the shop (Figure 1, page 50) is arranged to accommodate pupils from the ninth grade through the senior year of high school. This proposed shop includes facilities for teaching woodworking, mechanical drawing, electrical work, automobile mechanics, and general metal work, with ample storage and locker space for each. The classroom which houses the library is located on one side equipped for showing pictures related to the training program. The shop is located in a building separate from the main building. This eliminates disturbances caused by shop noises in other classrooms and provides a more adequate means of lighting and ventilation. The danger areas in the shop are painted red for safety purposes. The walls are painted a receding color to reduce the possibility of a glare. The floor is of concrete in all departments, except the office and drawing room. The machines are painted a color that will harmonize with the walls. All operating controls are painted a bright color, such as yellow, and all switches are painted red to promote safety. Working surfaces are painted light colors to contrast with the work.




General Shop Plan

Equipment Needed for Woodworking. The equipment listed for the woodworking course will include machines and tools which are necessary for work in cabinet-making, furniture repair, pattern-making and repair jobs in the home or community. The suggested equipment list was taken from the Industrial Arts and Vocational Education Magazine, for March 1950.

Equipment

| | |
|---|---|
| Benches, Woodworking 4 station | 3 |
| Bookcase | 1 |
| Bench, stain with metal top | 1 |
| Bench, glue 60x64x32 inches | 1 |
| Teacher's desk | 1 |
| Chalk board | 1 |
| Cabinets, filing | 2 |
| Lathe, wood, 14" swing | 2 |
| Router, electric hand | 1 |
| Shaper, wood, spindle, floor model | 1 |
| Circular saw, 10" tilting arbor | 1 |
| Band saw, 14" to 28", floor model | 1 |
| Scroll or jig saw, 18" to 24" | 1 |
| Drill press, ½" chuck, floor model | 1 |
| Jointer, 6" to 8", floor model | 1 |
| Sanding machine, disc & belt | 1 |
| Grinder, 2-wheel, pedestal | 1 |
| Saw, rip, 26", 5 or 6 point | 1 |
| Saw, cross cut, 26", 8 or 10 point | 6 |
| Saw, back, 12", 14 point | 4 |
| Saw, coping 6½ | 4 |
| Saw, turning, 14" | 1 |
| Saw, compass, 12" | 1 |
| Saw, key hole, 10" | 1 |
| Mitre box, steel, with saw | 1 |
| Saw set | 1 |
| Hammer, claw curved, 20 oz. | 1 |
| Hammer, claw, curved 16 oz. | 6 |
| Hammer, claw, ripping, 16 oz. | 1 |
| Hammer, soft face, regular, 8 oz. | 2 |
| Mallets, wood or rubber | 6 |
| File, cab., half-round, 2nd cut 8" | 2 |
| File, cab., half-round smooth cut 8" | 2 |
| File, cab., half-round, 2nd cut, 12" | 1 |
| File, cab., half-round smooth cut, 12" | 1 |
| Wood rasp, gastard cut, smooth cut, 8", each | 4 |
| Wood rasp, flat, bastard cut, 8" | 2 |

| | |
|---|---|
| Wood rasp, flat, smooth cut, 8" | 6 |
| File brush cleaner | 2 |
| Plane, block, 6" or 7" | 2 |
| Plane, smoothing, 9", cutter 2" | 1 |
| Plane, jack, 14" cutter 2" | 8 |
| Plane, jointer, 22", cutter 2 3/8" | 1 |
| Plane, rabbet, 8", 1½" cutter | 1 |
| Plane, router, ¼" to ½" cutters | 1 |
| Plane, rabbet, r.-l, hand size | 1 |
| Chisel, flat, ¼", 3/8", ½" each | 2 |
| Gouge, inside, 3/8", ½", 3/4", 1", socket, each | 2 |
| Gouge, outside, 3/8", ½", 3/4", 1", each | 2 |
| Turning set, 8 each, 6" | 2 |
| Screwdriver, handle, plastic, 4", 6" blade each | 2 |
| Screwdriver, handle, plastic, 8" blade | 1 |
| Screwdriver, handle, plastic, 12" blade | 1 |
| Screwdriver, phillips, No. 1-4 | 1 |
| Screwdriver, phillips, No. 5-9 | 1 |
| Screwdriver, bit brace, 3/16", ¼" each | 1 |
| Screwdriver, bit brace, 5/16" | 1 |
| Nail sets, 1/32", 2/32", 3/32" each | 1 |
| Try square, 6" blade | 4 |
| Try square, 10" blade | 4 |
| T bevel, 6", 8" blade, each | 1 |
| Square, standard steel, 24" x 2" | 1 |
| Square, standard steel, 16" x 1½" | 1 |
| Square, combination, 12" blade | 1 |
| Scraper, cabinet | 2 |
| Scraper, swan neck | 1 |
| Scraper, blades, 2½" x 4" | 2 |
| Scraper, blades 3" x 4" | 1 |
| Spoke shave 10", 2½" cutter | 2 |
| Hand beader, with cutters | 1 |
| Rule, zig zag, 6' steel | 1 |
| Rule, push, pull, steel | 1 |
| Rule, bench, steel, 12" x 3/4" | 6 |
| Rule, bench, steel 12" 1¼" | 8 |
| Rule bench, steel, 36" x 1½", each | 1 |
| Gauge, marking, 6" | 2 |
| Gauge, bit | 1 |
| Jig, doweling, ¼" to ½" | 1 |
| Brace, ratchet, 10" | 4 |
| Brace, universal, 10" | 1 |
| Drill, hand, 3/8" capacity | 1 |
| Drill, breast, ½" capacity | 1 |
| Auger drill, set, No. 3 to 16/16" | 1 |
| Forstner drill, set No. 4 to 16 | 1 |
| Gimlet drill, set No. 1 to 10/32" | 1 |
| Expansion drill, cutter 5/8" to 1½" | 1 |
| Countersink, rose, brace, 5/8" | 1 |
| Countersink, rose, brace, ½" | 1 |
| Twist drills, st. shank, 1/16" to ½" | 1 |

| | |
|---|---|
| Dowel sharpener | 1 |
| Knife, drawing, 8" | 1 |
| Knife, drawing, 10" | 1 |
| Knife, sloyd, 2 5/8" blade | 1 |
| Knife, sloyd, 1 7/8" blade | 1 |
| Knife, sloyd, 3½" blade | 2 |
| Knife, fiberboard | 1 |
| Calipers, outside, 6" | 1 |
| Calipers, outside, 8" | 1 |
| Calipers, inside, 8" | 2 |
| Dividers, wing, 8", 12", each | 1 |
| Clamps, bar, 4' | 6 |
| Clamps, bar, 5' | 6 |
| Clamps, bar, 6' | 4 |
| Clamps, C, carriage, 3", 4", 8" each | 2 |
| Clamps, C, carriage, 5" | 4 |
| Clamps, C, carriage, 6" | 6 |
| Clamps, C, carriage, 10", 12", each | 2 |
| Clamps, Jorgenson, No. 0 & 3, each | 4 |
| Clamps, Jorgenson, No. 1 | 6 |
| Clamps, Jorgenson, No. 2 | 8 |
| Clamps, Jorgenson, No. 4 | 2 |
| Pliers, combination, 8" | 2 |
| Pliers, combination, 6" | 1 |
| Pliers, side-cutting, 7" | 2 |
| Pliers, needle-nose, 6" | 2 |
| Stones, sharpening, carb., 2-face | 2 |
| Stones, slip, med. & fine grit, each | 2 |
| Grinding wheel tool dresser | 1 |

## Books on Woodworking

Douglass, J. H., and Roberts, R. H. Units in Hand Woodworking, Wichita, Kansas: McCormick-Mathers Company, 1932, 103 pages.

Hunt, DeWitt, and Tate, John B. Hand Woodworking, Oklahoma: Harlow Publishing Company, 1956, 282 pages.

Hjorth, Herman. Principles of Woodworking, Milwaukee, Wisconsin: The Bruce Publishing Company, 1948, 362 pages.

Wilber, Gordon O. Industrial Arts in General Education. Scranton, Pennsylvania: Internation Text-Book Company, 1948, 362 pages.

The Industrial Arts and Vocational Education Magazine, Milwaukee, Wisconsin: The Bruce Publishing Company.

Equipment Needed for Electrical Work. The equipment listed for the electrical working course will include tools sufficient for the operations such as splicing wires, removing insulations, soldering, connecting to binding posts, insulating, together with certain standards of constructional methods.

## Equipment

| | |
|---|---|
| Magnets, permanent, bar | 8 |
| Magnets, permanent, "U" | 8 |
| Electromagnets | 4 |
| Coil, magnetizing-demagnetizing | 1 |
| Compasses, pocket or hand | 2 |
| Battery, wet cell, 6 v. | 2 |
| Pliers, side-cutting 7" | 6 |
| Pliers, needle-nose, 6" | 6 |
| Pliers, combination, 6" | 4 |
| Pliers, round-nose, | 4 |
| Irons, soldering, electric | 6 |
| Transformer, 115/10 v., 30-50 w. | 1 |
| Ammeter, DC 0-10 scale | 1 |
| Ammeter AC 0-5, 0-30 scale, each | 1 |
| Voltmeter, DC 1-10 scale | 1 |
| Voltmeter, AC 0-150, 0-15 scale, each | 1 |
| Galvanometer, 50-0-50 scale | 1 |
| Rheostat, slide wire, 30 ohm, 4 amp. | 1 |
| Battery charger | 1 |
| Neon bulb, 2-watt, split electrode | 1 |
| Watt-hour meter, 5a., 125v., 60 c. | 1 |
| Circuit breaker, simple, 15 amp. | 1 |
| Screwdriver, plastic handle, 6" | 8 |
| Screwdriver, plastic handle, 8" | 4 |
| Soldering, coppers electric | 6 |
| Vises, machinist's 4" | 2 |
| Drill, portable electric | 1 |
| Wrenches, pipe 10", 12", and 14" each | 1 |
| Hammers, machinist's ball pein | 2 |
| Hack saw frames adjustable | 6 |
| Hack saw blades 10", 24 teeth doz. | 2 |

## Books on Electricity

Collings, Merle D. Projects in Electricity, Bloomington, Illinois: McKnight and McKnight, 1941, 80 pages.

Collins, Archie Fred. Fun With Electricity, D. Appleton Company, New York City, 1936, 238 pages.

Cook, Sherman. Electrical Things Boys Like to Make, Milwaukee, Wisconsin: The Bruce Publishing Company, 1942, 205 pages.

Dragoo, A. W., and K. L. General Shop Electricity, Bloomington, Illinois: McKnight and McKnight, 1941, 124 pages.

Ford, Walter B. Electrical Projects for School and Home Workshop, Milwaukee, Wisconsin: The Bruce Publishing Company, 1948, 168 pages.

Jones, E. W. Essentials of Applied Electricity, Milwaukee, Wisconsin: The Bruce Publishing Company, 1935, 238 pages.

Lehmann, Herbert. Shop Projects in Electricity, American Book Company, New York City, 1934, 190 pages.

Morgan, Alfred. Things a Boy Can Do With Electricity, New York City: Scribner and Sons, 1938, 243 pages.

Perry, Edgar, and Shafebrook, Harry. Fundamental Jobs in Electricity, New York City: McGraw-Hill Book Company, 1943, 447 pages.

Equipment Needed for Automobile Mechanics. The owner of an automobile should know something of the cause of common automobile failures and how to prevent them. The list of equipment for automobile mechanics courses in the schools will include tools and machines that are necessary for minor repairs and trouble-shooting of automobile engines. It will, also, give experiences which pupils should have in order to understand the fundamental principles of the engine.

Equipment

| | |
|---|---|
| Air Compressor - 3 to 4 cu.ft. with tank, piping and motor | 1 |
| Aligning Jig - for connecting rods | 1 |
| Anvil - No. 100 or 125 | 1 |
| Armature Growler and Tester | 2 |
| Axle Stands | 8 |
| Battery Equipment - Complete Unit | 1 |
| Bench - Electric Tester | 1 |
| Brake - Adjusting Stand | 1 |
| Brake - Band lining machine | 1 |
| Chain Hoist - With overhead trolley and track | 1 |
| Crane - Portable | 1 |

| | |
|---|---|
| Crank Shaft - Truing tool | 1 |
| Creepers | 7 |
| Dynamometer - electric | 1 |
| Drill - electric, portable ½" | 1 |
| Grinder - 8" with motor | 1 |
| Hones - Cylinder sets | 2 |
| Jacks - Lever, 1¼ ton | 3 |
| Jacks - floor roller | 2 |
| Lathe - metal | 1 |
| Valve Refacing Machine | 1 |
| Vulcanizing - electric steam for tube work | 1 |
| Welding outfit - complete | 1 |
| Wheel alignment - guage | 2 |
| Wheel Alignment - test table | 2 |
| Bolt cutters - 24" and 36", each | 2 |
| Calipers - 6" inside and outside, each | 2 |
| Oil cans - 1/3 pint | 3 |
| Cans - 5 gal. | 2 |
| Cans - gas, safety, 1 gal. | 2 |
| Can - waste | 3 |
| Fire Extinguishers | 3 |
| Gauges - air pressure | 12 |
| Gauges - Center | 4 |
| Gauges - depth | 3 |
| Gauges - Thickness | 3 |
| Gauges - thread | 3 |
| Glass cutter | 3 |
| Goggles - pairs | 4 |
| Grease guns - plain | 6 |
| Grease Guns - pressure type | 1 |
| Lamps - extension with shields | 4 |
| Micrometers - outside, 0 to 1" | 1 |
| Micrometers - outside, 2" to 3" | 1 |
| Micrometers - outside, 3" to 4" | 1 |
| Micrometers - inside, 1½" to 6" | 1 |
| Pullers - bearing | 2 |
| Pullers - gear | 2 |
| Pullers - wheel, hub type | 2 |
| Putty knives | 12 |
| Tool kits | 5 |

## Books on Automobile Mechanics


Automobile Facts and Figures, Automobile Manufacturers Association, monthly.

Crouse, William H. Automotive Mechanics, New York City: McGraw-Hill Book Company, 1946, 673 pages.

Dyke, Andrew. Automobile and Gasoline Engine, Chicago: Goodheart-Wilcox Company, 1940, 225 pages.

Fraser, Edward. Motor Vehicles and Their Engines, New York City: Van Nostrand Company, 1928, 136 pages.

Harper, Herbert. Automobile Shop Mechanics, New York City: Van Nostrand Company, 1926, 434 pages.

Judge, Arthur. Automobile and Aircraft Engines, London: McGraw-Hill Book Company, 1936, 900 pages.

Kuns, Ray Foster. Auto Mechanics, Milwaukee, Wisconsin: The Bruce Publishing Company, 1943, 343 pages.

Equipment Needed for General Metalwork. The equipment listed for the metalworking course in the school shop will include machines and tools which are necessary for work in sheet metal, ornamental iron, art copper and etc.

Equipment

| | |
|---|---|
| Arbor Press | 1 |
| Vise, bench, swivel type | 2 |
| Belt Lacer | 1 |
| Bench - metal working | 1 |
| Blower - for furnace | 1 |
| Blow torch - 1 pint size | 1 |
| Boring Bar | 1 |
| Bearing scraper | 1 |
| Bevel protractor | 2 |
| Brooms and floor brushes | 4 |
| Cans - Oil, 1 pt. | 3 |
| Chisels, cold, assorted sizes | 6 |
| Combination squares | 2 |
| Countersinks - for metal | 2 |
| Cutters | 2 |
| Dividers | 2 |
| Drills - assorted set | 1 |
| Topand die set | 1 |
| Dividing head | 1 |
| File cards | 2 |
| Files - assorted | 10 |
| First aid cabinet and supplies | 1 |
| Forge tools - sets | 1 |
| Gate sticks | 1 |
| Gauges | 5 |
| Goggles - pair | 2 |
| Hack saws | 4 |
| Hammers - ball pein | 5 |

| | |
|---|---|
| Nibbling machine | 1 |
| Pipe cutter | 1 |
| Punches - metal, hand or power | 2 |
| Soldering copper | 2 |
| Steel letters | 2 |
| Straightening press | 1 |
| Surface plates | 3 |
| Vises - machinist, pips | 1 |

Books on General Metalwork

Becker, William. Metalworking Made Easy, Milwaukee: The Bruce Publishing Company, 1942, 135 pages.

Bick, A. F. Artistic Metalwork, Milwaukee: The Bruce Publishing Company, 1940, 236 pages.

Dragoo, A. W. General Shop Metalwork, Bloomington, Ill.: McKnight and McKnight, 1939, 68 pages.

Hobbs, Douglass B. Working With Aluminum, Milwaukee: The Bruce Publishing Company, 1947, 126 pages.

Jones, Harry A. Metalwork for Grades 7, 8, 9. Milwaukee: The Bruce Publishing Company, 1939, 112 pages.

Kronquist, E. F., and Pelikan, A. G., Simple Metalwork, New York City: Studio Publications, 1940, 96 pages.

Tustison, F. E., and Kranzusch, Ray F. Metalwork Essentials, Milwaukee: The Bruce Publishing Company, 1936, 176 pages.

Equipment Needed for Mechanical Drawing. Mechanical drawing is a universal language by means of which the form, size, finish, color and construction of an object can be described accurately and clearly. The equipment listed will be of average and standard size for the purpose of teaching the students to construct drawings of projects to be made with all measurements and dimensions for the benefit of others who work from these drawings. This list will supply fourteen students.

Equipment

| | |
|---|---|
| Drawing Tables | 8 |
| Stools | 8 |

| | |
|---|---|
| Cabinet - steel, for filing | 1 |
| Drawing Boards - 18" x 24" | 8 |
| T-squares - 18" blade | 8 |
| Drawing sets | 8 |
| 45 degree triangles | 8 |
| 30°x 60° triangles | 8 |
| Lettering triangles | 8 |
| Triangular scale | 8 |
| Irregular curve | 2 |
| Protractors | 2 |
| Erasing shields | 8 |
| Drawing ink - black, waterproof, bottle | 8 |
| Drawing paper - tracing paper or tracing cloth, pkgs. | 8 |
| Thumb tacks - drafting tape | 8 |
| Dusting brushes | 8 |
| Arkansas oil stone - for sharpening ruling pens | 1 |
| Drop pens, detail pen, proportioned dividers, contour pin, beam compass, each | 1 |

Books on Mechanical Drawing

Ericson, Emanuel E., and Soules, Roy L. Planning Your Home, Peoria, Illinois: Charles A. Bennett Co., 1938, 176 pages.

French, Thomas, and Svenson, Carl. Mechanical Drawing, New York City: McGraw-Hill Book Company, 1934, 206 pages.

French, Thomas. Mechanical Drawing, McGraw-Hill Book Co. New York City: 1940, 300 pages.

Fryklund, V. C., and Kepler, F. R. General Drafting, Bloomington, Illinois: McKnight and McKnight, 1949, 160 pages.

Mattingly, E. H., and Scrogin, E. Applied Drawing and Design, Wichita, Kansas: McCormic-Mathers Co., 1940, 224 pages.

Walton, Ernest W. Forty Illustrations and How They Work, New York City: Watson Guptill Publishing Company, 1946, 318 pages.

The purpose of this chapter has been to design a suitable shop program for the separate schools of Dallas. The shops are planned and equipped to teach two or more areas of shop work at the same time. A summary of this report will be given along with recommendations for further study and improvement of the industrial arts program in the

Dallas Separate Schools in the following chapter.

# CHAPTER VI

## SUMMARY AND RECOMMENDATIONS

In this study an account is given of the history of industrial arts. An attempt has been made to cover some of the important events and developments, and show their influence on the development of industrial arts education in Negro schools in America and in Dallas. The study is based on a survey of the separate high schools in Dallas. The information gathered from the high schools has been used to propose a program for these high schools. It is intended that this proposed program would meet the community needs by preparing the students for available job opportunities as well as college.

Summary. Since a limited amount of material has been written about primitive man, little can be said about his contribution to education. The first important development in the history of industrial arts can be traced to the religious movement. The Jews taught some form of trade as far back as 2000 B.C. The first organized form of industrial arts was taught in the monasteries by the monks. Outside of the monasteries, apprenticeships were the principal form of education. The youths were taught a trade during the seven-year indentureship. This brought about the organization of the craft guilds, which was an important factor in raising the standards of workmanship and education. The foundation of educational systems stems from the influence of European advocates. The European imigrants contributed many ideas to the

educational systems in this country.

The industrial arts shops show a wide range of variations which is accounted for in some cases by the enrollment. Shops with large enrollments are better equipped than those with smaller enrollments. The expansion of the industrial arts programs seems to depend on increased enrollment which will in turn mean availability of additional funds. Other conclusions based on survey are:

1. Woodwork in some form is taught in every shop.
2. The greatest number of students are enrolled in woodwork.
3. Most of the shop time is spent in making projects for home use.
4. Equipment varies with shop size and enrollment and no shop has all the equipment needed.
5. Most shop teachers believe the program in use meets community needs.
6. Most shop teachers use a variety of advanced teaching methods.
7. Quality of projects and test are most generally used as measures of achievement.
8. Shop programs are designed to encourage independence of thought and action.

Recommendations. In planning a program of industrial arts for the separate high schools, many other features both desirable and needed occurred to the writer. It was impossible for a number of reasons to include these in the present program. Rather, they are presented as recommendations which would add to the effectiveness of any industrial

arts program now in use. It is hoped that industrial arts teachers be familiar with the history of the subject. This information can be an aid in motivating student interest. Teachers should expand their knowledge in as many fields as possible to meet the needs of the growing trend toward the general shop.

The courses of study presented in this report should be used and improved by the teacher to include additional material as the need arises through-out the courses. Teachers should realize they need to do a better job of advertizing the industrial arts program. This can be done through public relations. The public opinion of the industrial arts program has a direct relation to its importance in the general educational program.

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APPENDICES

A. Letter of Transmittal

B. Questionnaire

# APPENDIX A

Date _____

Dear Teacher,

In accord with the requirements of the Graduate School of Oklahoma State University of Agriculture and Applied Sciences, I am making a survey of the Industrial Arts Programs in the Separate Schools of Dallas.

Recent trends have caused greater emphasis to be placed on the role industrial education plays in the educational plan of students. Industrial Education is, indeed, gaining in prestige and importance.

It is my aim to gather information on the programs in effect in the Separate Schools of Dallas at the present time and with this information to present a total picture of the nature and character of the programs in use. Without your cooperation, the picture will not be complete.

May I ask, then, that you fill out the enclosed questionnaire or delegate its execution to a responsible faculty member and return to me within the next few days. A self-addressed, stamped envelope is enclosed for your convenience.

I shall be happy to inform you of my findings. May I stress the importance of your cooperation and punctuality in making this survey complete.

Respectfully yours,

Marvin Daniels
11933 Hoblitzelle Drive
Dallas, Texas

APPROVED:

C. L. Hill, Acting Head
School of Industrial Arts Education
Oklahoma State University

APPENDIX B

A Survey of the Industrial Education Programs
in the
Separate Schools of Dallas 1957-58

Marvin Daniels, Graduate Student
Department of Industrial Arts Education
Oklahoma State University of Agriculture & Applied Sciences
Stillwater, Oklahoma
Summer 1958

Name of School _____ City _____

Name of Teacher _____

Name of Shop or Room _____

Size of Room: Width _____ Length _____ Ceiling _____

On what Floor? _____ Part of Main Building? _____

Teaching Schedule

| Period No. | Time | Subject Taught | Grade Taught | No. in Class | Text Used |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Curriculum

1. Does Shop have a Library? _____ Number of books _____
2. What Visual Aids are used? _____
3. Projects: Students have free choice _____, assigned by Instructor _____
   Comments _____
4. Is course designed for General Education? _____
   Vocation Education? _____ or both? _____
5. Methods of teaching Used: Lecture _____, Demonstration _____
   Class discussion _____ Question and answer _____

6. How is student achievement measured? _____
7. Check if used: Job sheets _____ Work sheets _____ Course outline _____
8. Are unit tests given? _____ Final Examinations? _____
9. Does the shop curriculum meet local needs? _____
   How determined? _____

## Training of Industrial Arts Teachers

| Teacher | Degree held | Year Received | Institution | Major |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

## Equipment

In the following checklist, please give all the information requested for each item which is located in your shop. If you have equipment not listed in checklist, please list in space provided.

| Name | No. | Size | Condition |
|---|---|---|---|
| Variety saw | | | |
| Universal saw | | | |
| Band saw | | | |
| Jig saw | | | |
| Jointer | | | |
| Drill Press | | | |
| Shaper | | | |
| Surfacer | | | |
| Belt Sander | | | |
| Glue Pot | | | |
| Power Grinder | | | |
| Saw filing machine | | | |
| Wood turning lathe | | | |
| Benches | | | |
| Mortiser | | | |
| Tenoner | | | |
| Portable Sander | | | |
| Drawing boards | | | |
| T squares | | | |
| Stools | | | |
| Drawing tables | | | |
| Drawing sets | | | |

| Name | No. | Size | Condition |
|---|---|---|---|
| Radio | | | |
| Telephone | | | |
| Blow Torch | | | |
| Transformer | | | |
| Electric meter | | | |
| Electric motor | | | |
| Volt meter | | | |
| Angle brace | | | |
| Hydraulic lift | | | |
| Honing device | | | |
| Battery charger | | | |
| Storage batteries | | | |
| Auto sacks | | | |
| Universal testing mach. | | | |
| Forming roll | | | |
| Bar folder | | | |
| Beading machine | | | |
| Burring machine | | | |
| Wiring machine | | | |
| Turning machine | | | |
| Hollow mandrel | | | |
| Stake plate | | | |
| Soldering furnace | | | |
| Squaring shears | | | |
| Pneumatic riveter | | | |
| Plain break | | | |
| Pan break | | | |
| Leather hand tools | | | |
| Wood carving sets | | | |
| Loom weaving | | | |
| Etching Equipment | | | |
| Buffing Wheel | | | |
| Potters Wheel | | | |
| Kiln | | | |
| Plastic Oven | | | |
| Book Binding Equip. | | | |
| Silk screen printing | | | |

Date on which these questionnaires were filled out _____

Signature of Teacher _____

Street or Mailing Address _____

# VITA

Marvin Daniels

Candidate for the Degree
of Master of Science

Report: A SURVEY OF THE INDUSTRIAL ARTS PROGRAMS IN THE SEPARATE SCHOOLS OF DALLAS AND A PROPOSED PROGRAM FOR THOSE SCHOOLS

Major: Industrial Arts Education

Biographical and Other Items:

Personal Data: Born at Oklahoma City, Oklahoma, December 25, 1920, the son of Robert and Bessie Daniels.

Education: Attended grade school in Oklahoma City, Oklahoma; graduated from Douglass High School in 1939; received the Bachelor of Science degree from Langston University at Langston, Oklahoma, in 1947; attended summer school at Oklahoma State University during the summers of 1955, 1956, 1957, and completed the requirements for the Master of Science degree in August 1958.

Professional Experience: Entered the United States Army Artillery Corps in 1943; spent three and one half years in the service; was discharged from service with the rating of sergeant; taught four years at Sheppard Air Force Base, Texas; have been coach of the Lincoln High School and shop teacher for the past five years.

REPORT TITLE: A SURVEY OF THE INDUSTRIAL ARTS PROGRAM IN THE SEPARATE SCHOOLS OF DALLAS AND A PROPOSED PROGRAM FOR THOSE SCHOOLS

AUTHOR: Marvin Daniels

REPORT ADVISOR: Cary L. Hill, Acting Head,
School of Industrial Arts Education

The content and form have been checked and approved by the author and report advisor. Changes or corrections in the report are not made by the Graduate School office or by any committee. The copies are sent to the bindery just as they are approved by the author and faculty advisor.

TYPIST: Rose Chamberlain