A PROPOSED GENERAL SHOP PROGRAM

FOR A SMALL HIGH SCHOOL

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H.R.G.

CHAPTER I

AN INTRODUCTORY STATEMENT

The material contained in this report presents the development of the general shop, since its conception, to its present status. Selected phrases and definitions will be given in this report so that a better understanding and definite conclusions may be reached with clearness to all concerned.

Purpose of the Study. This study was made to obtain information concerning the work areas, of the general shop, best suited for small high schools. The writer hopes to use this information as an aid in organizing a general shop program.

Delimitations of the Study. This report does not contain the various methods of teaching the general shop. Since the methods of teaching vary in different situations, it is the belief of the writer that the teacher should develop methods best suited to these particular situations.

Research Technique. The information presented in this report was obtained from magazines, pamphlets and books found in the Oklahoma A. & M. College library. The historical content of this report was obtained from books written by recognized educators.

Definitions of Terms. In order to assure a better understanding of what is presented in this report, it is necessary that certain terms be defined. These definitions selected from various sources are:

> Manual Training. "Manual training is any form of constructional work that serves to develop the powers of the pupil through spontaneous and intelligent self-activity. The power of observation is developed through exacting demands upon the senses, the reason

by constant necessity for thought before action, and the will by the formation of habits of patient, careful application. (16, page 15)

Manual Arts. The expression "manual arts" . . . . embraces the graphic, mechanic, plastic, textile, bookmaking, and culinary arts. Historically, the term was an improvement over manual training because like Sloyd, it added the ideas of utility and design to the skill and hand training of manual training. (26, page 6)

Industrial Arts. Industrial arts is a group of school subjects that contributes to the attainment of the goal of general education by furnishing guided experiences in the use of tools, materials and machines, and insight into those phases of industry that have become an important part of our social culture. (30, page 1)

General Shop. 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. (19, page 15)

General Education. General education aims to develop general intelligence, the power of appreciation in all common fields of utilization, and the ability to use languages, mathematics, scientific methods, etc., without reference to any specific calling. (8, page 2)

Sloyd. A system of hand training which gratified more fully the child's creative impulses and seemed in other respects better adjusted to the nature of the child. (1, page 178)

Unit Shop. Shops which are equipped to teach one type of shopwork under one teacher are unit shops. (19, page 18)

Review of Similar Studies. Two similar studies, or studies concerned with the general shop, which the writer found to be of significant help in preparing this study are reviewed in the following paragraphs.

Hicks, James W., A Curriculum Study in the General Shop for A Large City High School, a master's thesis completed at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. The purpose of the thesis was to determine and present the situation of the general shop in 1950 and to make a course of study for Classen High School, Oklahoma City, Oklahoma.

Berry, Oscar B., The Development of A General Shop Program for A

Small High School (Negro), a master's report completed at Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma. The purpose of this report was to present the background of the general shop and additional information that should be followed in developing such a program.

Organization of Remaining Chapters. Chapter two is concerned with the history of the general shop; the development and background, and the development in America. In chapter three a brief history and philosophy of industrial arts is presented. Chapter four consists of the types of school shops and selected courses and equipment for the general shop. Chapter five consists of a summary and recommendations.

CHAPTER II

HISTORY OF THE GENERAL SHOP

Many people do not realize that changes in education must be made in order to keep pace with an expanding industrial world. In the beginning the student could equip himself for life by apprenticing himself to some tradesman to learn a trade. Today with the vast industrial empire, learning a single trade is not enough. As education expanded to meet these new requirements, the general shop was introduced as a means of broadening the experience of the students.

Part A

Early Development

For almost three-quarters of a century industrial subjects have claimed a place in secondary education in the United States. In this short period there has evolved an educational procedure for the development of general technical education and trade instruction which is surpassed in no other country. This procedure was influenced by several previous attempts at organized vocational industrial education.

European Influence, the Russian Plan. Of the several outside influences which affected American education, the first was probably the technical and trade instruction inaugurated by Della Vos, of the Imperial Technical Institute of Moscow, Russia, in 1868. This system of instruction became known as the "Russian Plan" and its influence is still felt in the present day teaching of industrial subjects. These influ-

ences are summarized in the following statement by Friese. (11, page 44)

1. The course of study was based upon occupational analysis.
2. Courses were built on the principle of working from the simple to the complex.
3. Subject matter was organized for teaching purposes.
4. Teaching methods were developed.
5. Pupils were trained in groups rather than singly.
6. Progress of the pupil could be determined at any time.
7. Both individual tool sets and benches and general tools were included in the equipment.
8. Pupils worked from drawings they had previously made.
9. Separate shops were established for the different equipments or trades.
10. Models and charts were hung on the walls of the shops.
11. The time required for learning a trade was shortened from that required under apprenticeship.
12. The accuracy required increased as the course progressed. One model was completed before another was begun.

The outstanding fact concerning the Russian system remains that it was the first to use scientific principles in analyzing the mechanic arts and basing courses of instruction on these analyses.

Swedish Sloyd. The Swedish "Sloyd", which was introduced into Scandinavia, used as its principle means of training the working of wood. In discussing the aims of educational sloyd, Bennett stated: (5, page 67)

> The Swedish system. . . .was worked out by an educator whose primary interest was the enrichment of the education of all children during the elementary school period, recognizing individual capacities and individual speeds in learning; it was an individual-production system, not a mass-production system, not a mass-production system of general education.

The Swedish system was for the purpose of general education; it was considered valuable for every child. It was an important contribution to present-day ideals and practices.

Development of Manual Training. Manual training was developed in the United States in the period between 1870 and 1880. It reached its

greatest period of growth between 1880 and 1890. During this period shopwork courses were introduced in many public schools. Bennett gives the following dates as being significant in the development of manual training in the United States. (5, page 558)

1880 St. Louis Manual Training School opened.
1880 Workingman's School opened in New York City.
1881 Woodworking Tools, How to Use Them, America's first textbook on school shop woodworking, published.
1881 New York Trade School opened.
1882 Dwight School Experiment in Boston.
1882 Montclare, New Jersey, began to teach manual training in the elementary schools at public expense.
1884 First publicity supported manual training high school opened in Baltimore.
1887 The Manual Training School, by C. M. Woodward, published.
1887 Industrial Education by Samuel G. Love, published.

Following the manual training schools, the new conception, "Manual Arts" was developed. In the manual arts schools more emphasis was placed on designing problems to be made in the school shop rather than to follow through with a series of set exercises. This was the first effort made to recognize individual differences and a beginning was also made in the extension of school shopwork into other trade, industrial, and craft fields. The manual training movement had spread rapidly and the introduction given had been advocated by educators for general educational purposes.

Part B

HISTORY OF THE DEVELOPMENT IN AMERICA

From about 1900 until the first World War, industrial arts, or "manual training" as it was then called gradually changed its point of view from a more formal type of work to the newer "Manual Arts". The first apparent organization of industrial arts instruction on a general shop basis was accomplished by Bonser and Russell at the Speyer

School of Columbia University in 1910.

The New "Manual Arts". From the newer "manual arts" point of view there developed four outstanding plans of shopwork. These methods of shop organization may be found throughout the United States today. They are: (22, pages 4-5)

1. The Ettinger Plan (Dr. William L. Ettinger formerly superintendent of schools in New York City) was the unit shop plan, where a student was routed through a series of special or unit shop.

2. The Gary Plan, (developed under superintendent William Writ of Gary, Indiana) provides for industrial experiences in a form of productive work under the direction of an experienced tradesman.

3. The Russell-Bonser Plan (of Teachers College, Columbia University) provides for a series of general contacts with industrial materials in a "general" or "composite" shop.

4. The Pittsburgh Plan is a combination of the Ettinger and Bonser plans, where a student during the first year is placed in a general shop to discover his interests and aptitudes and then spends the rest of his time in a unit shop.

These types of shop organization did not develop suddenly. They are best defined as trends in the history of shopwork. It should be noted that in each of these plans there is more emphasis on educational and guidance values than on the occupational training values which had been stressed in earlier manual training.

The Bonser-Russell Plan. As a first result of the analyses by Doctors Russell and Bonser and later experimentation, there was established the present conception of Industrial Arts for public school work. This conception known as the Industrial-Social Theory, or the Russell-Bonser Plan, was established and tried out by Dr. Bonser in 1910 in the

Speyer School, a demonstration and experimental school of Teachers College, Columbia University. The first course of study on this basis of organization was included in The Speyer School curriculum published in 1913.

A new type of shop known as a general or composite industrial shop or laboratory was created as a second result. This type of shop was designed to supplement the needs and demands of the new theory of organization. Activities such as; printing, sheet metal work, foundry, forging, general metal work, elements of machine shop, beginnings of auto mechanics, drawing, photography, and blueprinting, ship building, carpentry, shoe repair, textiles, ceramics, and other types of shopwork were introduced.

Examples of these shops were developed at the University Laboratory Schools of Chicago and Wisconsin, at the Lincoln School of Teachers College, Columbia University, and various city school systems, as in Milwaukee, Cincinnati, and Detroit. These shops have more than proved their worth as a progressive advancement in the field of industrial arts education. Newkirk says: (19, page 18)

> The General Shop is heralded as containing the solution of the industrial arts program in small schools. It has proven valuable as an educative and finding course for Vocational students who have no shop experience upon which to base the selection of a trade. The aims and basis of the general shop are in harmony with the best practices in the industrial arts field.

Especially has the general shop proven itself to be the type of shop activity best suited to the junior high school and small high schools were funds limited.

Early Changes From the Unit Shop to the General Shop. The change

from the unit shop to the general shop had a very slow beginning, as the teachers knew very little about the general shop plan. Teacher education institutions were slow in establishing facilities for the training of teachers in this field. The belief still existed that shop classes should all be kept together. The students worked from models or patterns with each new model increasing in difficulty as the student advanced in the course. Very little time was given to design or the correlation of one activity with the other. From the unit shops of this type it is only natural that the first general shop would combine the various unit shops, or crowd them into one central location. This resulted in one teacher teaching a number of unit-shop activities at one time.

The Current Situation of the General Shop. The general shop today remains much as it was twenty years ago; it is being utilized more on the junior high school level. Junior high students are fundamentally curious and eager to explore. They need to explore in order to understand, appreciate, and learn to manipulate tools, materials, and products. The general shop permits students to work with many different tools and materials, which is the reason for its popularity in the junior high schools. An increasing number of school administrators and shop teachers are discovering that the general shop is also highly suitable for offering industrial arts experiences in senior high schools.

A well organized and administered general shop program will be effective and successful on any school level in which a course in industrial arts is desired. However, one should have a clear conception of industrial arts and the general shop before planning such a program.

CHAPTER III

HISTORY AND PHILOSOPHY OF INDUSTRIAL ARTS

Before any type of industrial arts program can be developed one must be familiar with the history and philosophy of industrial arts. The activities of an individual or a small group of persons will reflect a recognizable philosophy which controls these actions. In this chapter a brief history and philosophy of industrial arts will be presented along with a list of objectives and definitions of industrial arts and the general shop.

Part A

Early Leaders of Industrial Arts in America

Two important figures in the development and evolution of manual training in America during the latter part of the nineteenth century were John D. Runkle and Calvin M. Woodward. In the early part of the twentieth century there was Frederick Gordon Bonser and Charles Russell Richards. These four gentlemen, and many others, made great contributions toward the development of the present day industrial arts program.

Calvin M. Woodward. In 1873 Woodward, who had been experimenting with manual education in a secondary school associated with Washington University, recommended the introduction of instruction in handwork into all secondary schools as a part of the general education of all boys. In 1879 he established the Manual Training School of Washington University. In order to secure funds for the erection of the building, which had to come from private individuals, he was forced to make its purpose largely

vocational.

In the book, Manual Training School, Woodward has this to say about the contributions of Russia: (29, page 277)

> To Russia belongs the honor of having solved the problem of tool instruction. Others had admitted that practice in using tools and testing materials should go hand in hand with theory; but Russia first conceived and tested the idea of analyzing tool practice into its elements and teaching the elements abstractly to a class. In their hands, manual tool instruction has become a science. Here is the point of view where the best manual training schools differ radically from the ordinary system of apprenticeship. In the latter, the learner acquires the arts involved in a piece of work incidentally, and generally without a conscious analysis; in the former, the arts are made the direct object of his study and attention. Their subsequent combination (which may or may not follow in his school experience) is a very simple matter.

American leaders in industrial education had not discovered a systematic method of presenting tool instruction. Woodward, Runkle and several others were prepared to welcome the complete presentation of the Russian system.

John D. Runkle. In 1876, Runkle visited the Centennial at Philadelphia and was very much impressed. The system for which he had been looking was presented in the exhibit of the Imperial Technical School of Moscow. Runkle was confronted with a problem similar to that of Woodward. He had noticed that the small number of students who had entered the mechanical engineering course and who had a knowledge of shopwork readily secured positions upon graduation, while others with no shop experience were rather slow in getting employment. Runkle believed it was best not to train a person to master any particular trade in school, but to cultivate skill in "the elements which underlie all industrial pursuits". He believed the Russian system was an example of his ideas. In referring to his experience at the exposition Runkle said: (29, page 3)

> At Philadelphia, in 1876, almost the first thing I saw was a small case containing three series of models, one of chipping and filing, one of forging and one of machine tool work. I saw at once that they were not parts of machines, but simply graded models for teaching the manipulations of those arts. In an instant, the problem I had been seeking to solve was clear to my mind; a plain distinction between a mechanic art and its application in some special trade became apparent.

The school of Machanic Arts in Boston was established through the recommendations of Runkle. This school was opened to boys who had graduated from grammar school and to those who could pass examinations in arithmetic, geography, and English composition and who were not less than fifteen years of age.

Frederick G. Bonser. Bonser, a professor of education at Teacher's College, Columbia University in 1913, enlarged the conception of industrial arts in the elementary school. He believed that elementary education at that time needed reforming, and suggested full use of industrial arts. He insisted that as a school subject, industrial arts should be ranked along with other subjects offered. To emphasize this philosophy Bonser wrote: (4, page 454)

> From this standpoint, it will at once appear that primary emphasis will not be placed upon production of industrial commodities, but rather upon intelligence and cultivated taste in their choice and use. In no single field will all of the children function as producers, but from everyfield worthy of study they will all function as consumers. The largest problems are those of developing an appreciative understanding of industry as it is at the present time, realizing its social problems and cultivating intelligent judgment and appreciation in the selection and use of industrial products.

Bonser's conception of industrial arts was similar to that of Dewey. He believed that the choosing and consumption of industrial commodities was more important than their production.

Charles C. Richards. Richards probably became best known by an editoral in the 1904 publication of "The Manual Training Magazine", in which he suggested that the term "industrial arts" be used in place of "manual training." He based his contentions on the fact that the prevailing trend was to stress the elements of industrial fundamentals to civilization rather than the outmoded disciplinary thought of manual training. The following is a condensation of Richard's editoral quoted from Bawden's book, Leaders in Industrial Education. (2, page 23-24)

> "As evidence of a change in our point of view we are leaving behind the purely disciplinary thought of manual training. . . .As long as constructional work represented an instrument to train the mental powers through the hand, manual training constituted a workable and fairly suggestive title. . . .But now we realize that there is no such thing as a training of general powers through special exercises, and at the same time we are beginning to perceive the immense content meaning of our field. . . .
>
> We are beginning to see that the people of our work is nothing short of the elements of industries fundamental to modern civilization. . . .Instead of devoting our attention to miscellaneous and more or less meaningless projects, we seek in an orderly way to develop insight into the basic industries of our times, and knowledge of some of the steps through which these have reached their present form. . . .
>
> Behind every other subject in the curriculum is a body of ideas of fundamental meaning and importance. The industrial arts stand for one of the most vital and important phases of modern civilization. . . .We should discard the term "manual training", as both inappropriate and misleading.
>
> In the hope of enlisting consideration and discussion the writer proposes the term "industrial arts", which indicates a definite field of subject matter. The word arts is inclusive of both the technical and esthetic elements, and the qualifying word point specifically and comprehensively to the special field of our material.

Richard's suggestion was favorably received. Teachers began to use the new term and today "industrial arts" has almost completely replaced the former term "manual training".

Part B

A Philosophical Concept of Industrial Arts

A clear conception of a subject is a prerequisite to establishing a philosophy. To completely understand the term "industrial arts", one must carefully consider its definitions and objectives.

Definitions. It is the opinion of the writer that the following definitions, taken from different sources, interprets the current philosophy of industrial arts.

> Industrial arts is the study of materials and of the desirable changes made by hand or by the several manufacturing processes from the raw state into products designed to meet the consumer's needs and comforts for daily living. (20, page 5)

> Industrial arts is the phase of general education which deals with industry--its organization, materials, processes, and products--and with the problems resulting from the industrial and technical nature of society. (27, page 2)

> Industrial arts is a group of school subjects that contributes to the attainment of the goal of general education by furnishing guided experiences in the use of tools, materials and machines, and insight into those phases of industry that have become an important part of our social culture. (30, page 1)

> Industrial arts are those occupations by which changes are made in the forms of materials to increase their values for human usage. . . .industrial arts is a study of the changes made by man in the form of materials to increase their values, and of the problems of life related to these changes. (7, page 5)

The definitions quoted in this section indicate that industrial arts is a subject designed to provide the student with a knowledge and some experiences in the modern advancements of an industrial world. Industrial arts is a course that is helpful in preparing students for life in an industrial democracy.

Objectives of Industrial Arts. Industrial arts, as a part of general education, does not have a set of objectives which industrial arts

alone supports, but it does make unique contributions to objectives which are common to the entire school program. Industrial arts is not a separate field of instruction. The objectives stated by Newkirk are: (20, page 7-13)

1. To develop the ability to plan and complete projects, using a variety of tools and construction materials in a workman like manner.

2. Give experience that will increase understanding of modern industry and that will lay the foundations for and help determine vocational interest.

3. Develop the ability to read and make working drawings, charts, and graphs.

4. Develop the ability to recognize quality and design in the products of industry.

5. Develop the ability to maintain and service in a safe and efficient manner the common products of industry.

6. Provide an objective medium for expression in mathematics, science, language, arts, and social science.

7. Develop an interest in crafts as a valuable medium for creative expression in leisure time.

8. Give experience that will develop social understanding and the ability to work effectively with other either as a leader or as a member of the group.

In the Industrial Arts in Oklahoma, Bulletin, the policies committee formulated the following objectives for industrial arts. (30, page 24)

1. Industrial arts is complementary to other school subjects and provides opportunities to apply knowledge learned in other school subjects.

2. Develops an appreciation of applied knowledge and skills.

3. Provides a knowledge of industrial drawing, the language of industry, and methods of expressing ideas by means of drawings.

4. Contributes to later vocational efficiency.

5. Stimulates students' knowledge and appreciation of good design.

6. Instils a satisfaction in personal creative achievement.

7. Develops the ability to analyze a job into its processes and organize them into correct procedure.

8. Contributes to consumer knowledge and induces an application of the value of industrial materials and the need for their conservation.

9. Trains in industrial and home safety (including fire prevention.)

10. Acquaints students with industrial information and induces a recognition of the standards of industrial attainment.

11. Develops avocational interests.

12. Trains individuals to be more resourceful in dealing with the material problems of life.

13. Stimulates correct attitudes toward an orderly shop and home and their environment.

14. Aids in making vocational choices.

15. Develops qualities of leadership.

16. Develops cooperative attitudes in work habits.

17. Develops an appreciation of the dignity and importance of the occupation of one's neighbor.

These lists of objectives reveal that the philosophy of industrial arts has remained basically the same throughout the history of the industrial arts movement.

Part C

A Philosophical Concept of the General Shop

A clear conception of the term "general shop" is necessary before a program can be introduced effectively. This plan is frequently referred to as a multi-activity program conducted within a single shop by one teacher, with two or more activities in operation at the same time.

Definition of General Shop. General shop is defined by Newkirk and Snoddard as follows: (18, page 11)

> The general shop is a broad group of educative industrial arts activities embracing techniques of shop organization and teaching method which enables a community, whether large or small, to present a unified core of content based on life needs as summarized in these aims; developmental experience interpretative of the major phases of the world's industrial work, "handy-man activities," consumer's knowledge and appreciation, guidance, hobbies, social habits, and (for a very small per cent) vocational preparation.

The general shop is particularly well suited to teaching industrial arts content, and makes it possible for the small high school to present an adequate industrial arts program.

Objectives of the General Shop. The principle objectives of manual training was the development of a high degree of skill through manipulative processes with one kind of material. This aim is not as important as that to be realized through the general shop, namely, the acquiring of knowledge of a variety of materials and processes rather than the development of a high degree of skill using only one material.

Williams, in his article, "Building a General Shop Curriculum", listed the following objectives: (28, page 307-309)

1. To introduce common materials of industry.
2. To acquaint students with the basic tools and processes of industry.
3. To provide pupils of all degrees of aptitudes an opportunity to engage in wholesome, creative endeavor.
4. To develop in each pupil a certain degree of skill in the hand processes of industry.
5. To provide related information incident to the manufacturing and building industries.
6. To develop in each student an attitude of pride and joy in wholesome accomplishment.

7. To develop in each pupil safety consciousness, and thoughtful procedure.

8. To provide a teaching situation of cooperative group activities.

The policies committee, for the American Vocational Association Bulletin, lists the following objectives: (31, page 44)

1. Construction of useful products.

2. Problem solving through pupil plan sheets.

3. Figuring cost and following logical procedure.

4. Drawing, sketching, design and color.

5. Pupil personnel management system.

6. Safety and health.

7. Good housekeeping.

8. Maintenance of tools and machines.

9. Conservation and utilization of resources.

10. Nomenclature of tools, machines, and technical terms.

Objectives of the general shop are essentially the same as those for industrial arts. However, there are differences between the general shop and the unit shop on the basis of organization. General shop situations introduce many distinct advantages and disadvantages when compared with the unit type of shop. These different types of general shop now shall be discussed in the following chapter.

CHAPTER IV

THE GENERAL SHOP

Probably the outstanding characteristic of the general shop is its suitability to the junior high and small high school. In these small schools, the only possibility of offering any variety of industrial arts activities is in the general shop, since their industrial arts program must be limited to one shop and one teacher.

Part A

Types of School Shops

A school district, instituting or enlarging an industrial arts program in its schools, may choose a type of shop organization best suited to its needs. There are, in general, three types common in the public schools of this country; the comprehensive (or composite) general shop, the limited (or general unit) general shop, and the unit shop.

Comprehensive General Shop. The comprehensive general shop provides pupil experience in a number of different industrial activities carried on simultaneously in one room, under the direction of one teacher. This type of shop is recommended as the soundest approach to the basic industrial arts courses in the junior high and small high school areas. It is possible to include eight or more units of work in this type of shop; however, it is recommended that the shop be started with fewer types of activities and then expanded if deemed desirable.

Limited General Shop. The limited general shop, (or general unit shop), provides for a wide range of activities confined to one general

classification of material. A general metal shop will provide work areas in foundry, sheet metal, machine tool, forging, and so on in metal production activity. The general unit shop is recommended when more than two and not more than five shop units are required to meet the industrial arts needs of a school district.

Unit Shop. The unit shop is limited to work in one industrial material such as wood, or sheet metal, etc. This type of shop is much more specific in nature than the other shops which have been previously described. It is not recommended for schools that can provide only one shop program.

Advantages of the General Shop. A wider experience through working with more varied materials may be obtained in the general shop program. The popularity of the general shop is, to a large degree, due to the following advantages, listed by Newkirk in his book, Organizing and Teaching the General Shop. (19, page 18-19)

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.

Ericson, in Teaching the Industrial Arts, makes this comment: (9, page 128-129)

> The general shop offers the teacher the opportunity to be of more than ordinary service to his students. Compared to the single woodworking shop so prevalent in many small communities, it furnishes breadth of subject matter and experience, appeal to interest, variety in operations, and preparation for care and upkeep of a home.

It is true that the general shop has many advantages. However, it is far from being perfect. There are still many teachers in the industrial arts field who prefer the unit type shop.

Part B

Selected Courses for the General Shop

Before one can develop an effective shop program, consideration must be given to the number of subjects and their importance in the community. It is the belief of the writer that the following subjects are of greater importance in the small high schools.

General Drawing. General drawing should be thought of as a communication subject. In fact it was used as such before the alphabet was developed. Drawing has fundamental services to perform for both education and life. Daily contact with this unit is unavoidable. The objectives of general drawing as listed, in American Vocational Association Bulletin, by the policies committee are: (31, page 46-47)

1. Become acquainted with the basic principles of design and how to apply them.
2. Learn to read and interpret sketches and working drawings.
3. Learn to interpret the symbols used in common types of drawing.
4. Develop a certain amount of skill in the basic fundamentals of drawing.
5. Learn to recognize and practice good drawing techniques.

6. Increase consumer knowledge.

7. Obtain experiences in, and information about, the various types of drawings used in industry, in order that a more intelligent choice of a vocation may be made.

Woodworking. Woodworking, as it is generally taught, consists of learning about lumbering, use of hand and machine tools, and orderly procedure in making a project. The following objectives are listed as a sample of pupil-teacher cooperative effort: (31, page 51)

1. Develop some skill in use of woodworking tools and machines.

2. Use these skills in making projects or repairs which will give special satisfaction.

3. Develop some skills in related subjects such as mathematics and science.

4. Learn the characteristics, sources, and uses of the woods being used.

5. Acquire information about the role of woodworking in the industrial environment.

6. Learn to identify and maintain certain kinds of wood finishes.

7. Learn to identify and evaluate several common types of construction.

Metalwork. Students should gain experience in metalworking, because many will be producers, and all will be consumers of metal products. In the general shop the main idea is to acquaint the students with the basic fundamentals of working with metal. To be truly representative, a course in metalworking should include such major metalworking activities as bench metal and wrought iron, sheet metal, art metal and jewelry, spinning, foundry, forging, heat treating, machine shop and welding.

Electricity. The importance of teaching electricity cannot be overestimated because everyone uses electricity in one form or another. Elec-

tricity should be taught in the general shop to acquaint students with minor repair work in electrical appliances. These minor repairs may include fixing ends of extension cords, splicing together broken wires, and the repairing of defective switches and electrical outlets.

A Proposed Schedule for Selected Courses. This schedule, designed for a small high school, is proposed to accommodate ten students. These ten students, enrolled in general shop two semesters (a complete school year), will pursue the following schedule:

FIRST SEMESTER

STUDENTS	WORK AREA	TIME DEVOTED TO AREA
10	General Drawing	6 Weeks
10	Woodwork	12 Weeks

SECOND SEMESTER

STUDENTS	WORK AREA	TIME DEVOTED TO AREA
5 (first)	Metalwork	First 9 Weeks
5 (second)	Electricity	First 9 Weeks
5 (second)	Metalwork	Second 9 Weeks
5 (first)	Electricity	Second 9 Weeks

Outline of Operations and Related Information. The main purpose of this outline is to furnish suggestive teaching content appropriate to the different areas of work. These areas are; general drawing, woodwork, metalwork, and electricity. However, modifications may be made for the different types of shop organization. The writer developed this outline, for the previous mentioned areas, by modifying the outline listed in Course Outlines for Industrial Arts, Richmond, Virginia. (32, page 15)

TERMINOLOGY:

Manipulative Operation is expressed as a lesson involving depicting, shaping, forming, and assembling operations.

a. A depicting operation is one that has to do with portraying or describing something such as sketching, laying out or drawing.

b. A forming operating problem is one that has to do with the changing of material by heating, bending, molding, welding, etc.

c. A shaping operation is one that has to do with the changing of the shape of material with edge tools and grinding.

d. An assembling operation is one that has to do with fitting or joining parts together.

Related Information is information a pupil should have about the area he is studying.

a. Technical information is information the pupil must have about the area he is studying.

b. Guidance information is that which has vocational guidance value. It gives the pupil information about various occupations and the opportunities they present.

c. General information is information that is good for a pupil to have but is not essential to do the job.

INTRODUCTORY TO GENERAL DRAWING

Suggested Period 6 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
1. How to make different types of sketches (Freehand)	Technical 1. Kinds of sketches Guidance 1. The type and importance of drafting in industry

INTRODUCTORY TO GENERAL DRAWING (Cont.)

Suggested Period 6 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	General 1. The history of drawing
2. How to letter alphabet and numerals (Freehand)	Technical 1. Types of lettering. The purpose of lettering on drawings. Guidance 1. Opportunities in the drafting field General 1. Origin and history of present alphabet
3. How to sketch an isometric cube (Freehand)	Technical 1. Principles of isometric projections a. Differences between isometric projection and isometric drawing General 1. Comparison of isometric in perspective drawings
4. How to dimension an isometric drawing (Freehand)	Technical 1. Rules for dimensioning pictorial drawings General 1. Dimensioning, standard practices
5. How to title a sketch (Freehand)	Technical 1. Information needed on a sketch General 1. Information generally found in titles 2. Various types of titles used in industry
6. How to make an isometric sketch of a wedge and pryamid (Freehand)	Technical 1. Developing inclined lines

INTRODUCTORY TO GENERAL DRAWING (Cont.)

Suggested Period 6 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	General 1. Area, method of computing and volume of a wedge and pryamid
7. How to sketch an isometric cylinder (Freehand)	Technical 1. Principles of circular isometric projection General 1. Methods of computing area and volume of a cylinder 2. Methods of making ellipses
8. How to sketch an isometric cone (Freehand)	Technical 1. Relation of a cone to a cylinder 2. Parabolas, hyperbolas, and cone sections General 1. Methods of computing area and volume of cones
9. How to fasten drawing paper on the drawing board	Technical 1. Use of T square for lining left top edge of paper 2. Use of drafting tape General 1. Kinds of paper used in industry by professional draftsmen 2. Methods of fastening paper a. Advantages of each
10. How to sharpen a drawing pencil	Technical 1. Advantages of using correct pencil 2. Degrees of hardness of drawing pencils General 1. The manufacture of drawing pencils
11. How to lay out the drawing sheet	Technical 1. Use of T square, triangle, scale and pencil

INTRODUCTORY TO GENERAL DRAWING (Cont.)

Suggested Period 6 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	2. Review lesson on how to read a scale Guidance 1. Opportunities for advancement in the drafting trade
12. How to draw oblique lines	Technical 1. Use of the T square and triangle combination 2. Various triangle combinations to obtain different angles
13. How to use symbols on a drawing	Technical 1. Symbols used for different materials 2. Review of alphabet of lines
14. How to draw three view in third angle orthographic projection	Technical 1. The theory of third angle orthographic projection
15. How to lay out the required views on drawing paper	Technical 1. Centering the views on drawing paper
16. How to use different weight lines on drawings	Technical 1. Description of lines and good drawing technique
17. How to make a scale drawing	Technical 1. The architect's scale a. Common scales used on drawings General 1. Types of scales used by draftsmen

INTRODUCTION TO WOODWORK

Suggested Period 12 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
1. How to read a working drawing	Technical 1. Simple pictorial drawing

INTRODUCTION TO WOODWORK (Cont.)

Suggested Period 12 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	2. Simple orthographic projection Guidance 1. The relationship of blueprint reading to woodworking industry General 1. Various methods of reproducing drawings
2. How to measure with the rule	Technical 1. Divisions of an inch, foot, and yard General 1. Common woodworking rules 2. Calculation of board measure
3. How to lay out stock	Technical 1. Use of the steel square and try square 2. Measuring tools Guidance 1. The importance of accuracy in industry
4. How to cut stock	Technical 1. Types of woodcutting saws Guidance 1. The job of a millman General 1. Making a bill of material 2. Common types of wood used in woodworking
5. How to gauge lines with a marking gauge	Technical 1. Gauge with the grain only
6. How to square stock	Technical 1. The use of the plane a. How to assemble and adjust a plane 2. The use of the back saw

INTRODUCTION TO WOODWORK (Cont.)

Suggested Period 12 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	Guidance 1. The lumbering industry General 1. How lumber is quarter-sawed
7. How to sharpen edge tools	Technical 1. The use of the grinder 2. The use of the sharpening stone Guidance 1. Tool grinding as an occupation
8. How to lay out and cut a chamfer	Technical 1. Adjusting and using a sliding T-bevel General 1. Description and use of various type planes
9. How to bore and drill holes	Technical 1. The use of the brace and auger bit 2. The use of the hand drill 3. The use of the countersink General 1. Size of auger bits, wood boring drills and twist drills
10. How to drive and draw and set nails	Technical 1. The use of the claw hammer General 1. Types of nails a. How made and sold 2. Use of the nail set
11. How to fasten with screws	Technical 1. The types and use of drivers for screws General 1. Types of screws a. How made and sold

INTRODUCTION TO WOODWORK (Cont.)

Suggested Period 12 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	2. Other types of common fasteners used in woodworking
12. How to shape with a spokeshave	Technical 1. Adjusting and using a spokeshave a. Roughing b. Smoothing General 1. The use of the drawknife a. Removing waste stock
13. How to trim with a chisel	Technical 1. Horizontal, vertical, convex, and concave trimming General 1. Safety in the use of hand tools 2. Types of chisels
14. How to glue wood together	Technical 1. The use of hand screw clamps, c-clamps, and bar clamps General 1. Types of glue and wood joints
15. How to scrape a surface with the hand scraper	Technical 1. Types of scrapers and their use General 1. How to sharpen hand scrapers
16. How to sand wood surfaces	Technical 1. Types of sandpaper and how they are used Guidance 1. Furniture repairing as a hobby General 1. How sandpaper is made and sold
17. How to apply stain	Technical

INTRODUCTION TO WOODWORK (Cont.)

Suggested Period 12 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	1. Selecting the proper stain General 1. Kinds of stain on the market
18. How to apply wood finishes	Technical 1. Kinds of wood finishes 2. Care of brushes Guidance 1. Furniture finishing as a trade
19. How to apply wax	Technical 1. Types of wax and various examples of wax finishes

INTRODUCTORY TO METALWORK

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
1. How to lay off distances with a rule	Technical 1. How to read a rule 2. Types of rules used in metal work Guidance 1. Opportunities in the field of sheet metal work General 1. Safety in the metal shop
2. How to lay out work with a steel square, combination square and the scriber	Technical 1. Geometry used in the sheet metal layout Guidance 1. Job opportunities for sheet metal draftsmen General 1. How to read elementary sheet metal blueprints

INTRODUCTORY TO METALWORK

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
3. How to lay out a circle with dividers	Technical 1. Description and use of drafting equipment 2. Measuring irregular lengths Guidance 1. Layout men in industry General 1. Location of iron ore and how it is mined
4. How to develop rectangular forms	Technical 1. Review use of drafting equipment 2. The care of drafting equipment General 1. Markets for iron ore
5. How to develop cylindrical forms	Technical 1. Making patterns for sheet metal work General 1. Transporting iron ore
6. How to develop conical forms	Technical 1. Measuring with a caliper rule 2. Measuring the thickness of sheet metal with a metal gauge. General 1. Changing iron ore to metallic ore
7. How to transfer a pattern to sheet metal	Technical 1. Grades of tin plate and galvanized iron General 1. Characteristics of pig iron 2. Sheet metal gauges
8. How to cut sheet metal with tinners snips a. Straight work	Technical 1. Description and use of common types of tinners snips: straight

INTRODUCTORY TO METALWORK (Cont.)

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
b. Curved work; inside, outside	snips, double cutting, hawk's bill, curved snips General 1. Safety in handling metals 2. Care and storage of sheet metal tools
9. How to cut sheet metal on the squaring shear	Technical 1. Description and use of the squaring shear; safety precautions in using the squaring shear General 1. Sheet metal products; how to select good manufactured metal products
10. How to cut sheet metals with a cold chisel a. Using cold chisel and plate b. Using cold chisel and vise c. Cutting irregular forms	Technical 1. Description and use of the common cold chisel 2. Method of sharpening cold chisel General 1. Description of various types of sheet metal
11. How to cut thin sheet metal with a jeweler's saw	Technical 1. Improving the appearance of a metal surface by piercing Guidance 1. Sheet metal industry in country, state jobs, wages and working conditions General 1. Original designs-collecting ideas for scrapbook of designs
12. How to saw metal with a hack saw	Technical 1. Description and use of the hack saw; types of frames; teeth

INTRODUCTORY TO METALWORK (Cont.)

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
13. How to cross file sheet metal	Technical 1. Description and use of files; kinds of cut
14. How to brake sheet metal by	Technical 1. The proper use and care of the mallet; wood, fiber General 1. Qualities and characteristics of the tin roof; advantages, disadvantages
15. How to bend metal with a handy seamer	Technical 1. Bending long pieces by the hand method Guidance 1. Avocational opportunities in sheet metal; tin can projects; equipment necessary for home workshop General 1. Characteristics and uses of sheet metal 2. How to buy tin plate and galvanized iron for home use
16. How to make hems and seams a. Lap seam - folded seam, grooved seam b. Single hem - double hem	Technical 1. Description and use of the bar folder 2. Bending metal using vise, angle iron General 1. How pig iron is changed to steel using Bessemer process
17. How to tin a soldering copper	Technical 1. Description of types of soldering coppers, flux, gas furnace, blow torch, etc. 2. How to light and use the gas furnace and blow torch - safety precautions

INTRODUCTORY TO METALWORK (Cont.)

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	General 1. Characteristics and uses of black iron sheets
18. How to solder galvanized iron a. Soldering flat seams b. Soldering overhead seams c. Sweat soldering d. Soldering with a blow pipe	General 1. Characteristics of copper and its general use
19. How to form sheet metal by hand	Technical 1. Sheet metal worker's stakes: Beakhorn, coppersmith square stake, creasing stake, conductor stake, candle mold stake, blowhorn stake, needle case stake, bevel edge square stake General 1. Safety practices when using sheet metal worker's stakes
20. How to burr an edge by hand	General 1. Characteristics of the different types of solder and their uses
21. How to locate the position of a hole with a center punch	General 1. Source and characteristics of lead and zinc
22. How to punch a hole with a solid punch, hollow punch, bench lever punch	General 1. Description and use of the various type rivets
23. How to drill a hole in sheet metal with a hand drill	General 1. How to use self tapping screws
24. How to set a rivet and how to head a rivet	General 1. Kinds and sizes of drills

INTRODUCTORY TO ELECTRICITY

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
1. How to make a diagram of a simple bell circuit	Technical 1. Simple electrical symbols 2. The use of the scale 3. Drawing to proportion Guidance 1. Opportunities for the draftsmen in the electrical field
2. How to wire a simple bell circuit	Technical 1. Electrical conductors and insulators 2. Dry cells 3. Simple electrical switches 4. Open and closed circuits Guidance 1. Opportunities in the field of signal writing General 1. Characteristics of electricity
3. How to wire one bell to be operated with two push buttons-two bells operated with one push button	Technical 1. Series and parallel circuits General 1. Christmas tree lights - advantages of parallel and series circuits. 2. Cooperation in use of material and equipment
4. How to make an electric magnet	Technical 1. Magnetic materials a. Permanent and non-permanent magnets General 1. Use of magnets in everyday life, auto, earth, etc. 2. Conservation of materials and orderly storage of same
5. How to connect dry cells in series and in parallel	Technical 1. Measurement of direct current, amperage, voltage

INTRODUCTORY TO ELECTRICITY

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
	General 1. Safety precautions in handling electrical circuits
6. How to make electrical splices How to use electricians' pliers	Technical 1. Splices: rat tail, western union, tee and cable Guidance 1. The occupation of cable splicer General 1. Characteristics of good splices
7. How to solder connections	Technical 1. Kinds of soldering fluxes Methods of soldering General 1. Property of solder 2. Composition of fluxes
8. How to tape splices	Technical 1. Tapes and purposes of electrical tapes General 1. Manufacture of tapes and insulating materials
9. How to make a simple electricity cell	Technical 1. Simple wet cell 2. Simple storage cell 3. Construction of dry cell 4. Rotating of storage cells 5. Reading of dydrometer Guidance 1. Chemistry in the electrical field General 1. Safety precautions in handling acids 2. Reaction of acids on various metals

INTRODUCTORY TO ELECTRICITY (Cont.)

Suggested Period 9 Weeks

MANIPULATIVE OPERATIONS	RELATED INFORMATION
10. How to maintain and care for storage cell	Technical 1. Checking voltage of storage battery 2. Charging storage battery Guidance 1. Opportunities in automotive electricity General 1. Reading electrical instruments 2. Use of storage batteries in our daily life 3. How dependent we are on the storage battery
11. How to collect a static electrical charge	Technical 1. Types of electrical charges General 1. Uses of static electricity - electrical storms - radio, dust collectors, etc.

Part C

Shop Equipment

The task of equipping an industrial arts shop carries with it a great amount of responsibility. The purchasing of school shop equipment is a long term investment because machines and tools are usually expected to last a considerable number of years.

Factors in the Selection of Equipment. Too often equipment has been purchased with little concern for the needs of the community, the courses that are offered, what is taught in those courses, and how the work is taught. The hard usage machines and tools received from inexperienced operators necessitates the selection of first quality equipment for the general shop. The determining factors, listed by Newkirk, in the selection of equipment suitable for a general shop are: (19, page 87)

1. The aims and content of the course of study.
2. The resources of the community.
3. The instructional areas represented in the shop.
4. The number of students taking the work at one time.

Developing the Equipment List. It is obvious that a list of equipment cannot be standardized because of the various conditions under which the equipment must be used and the objectives which are to be achieved in the shop. Before making out a list of equipment the teacher should become familiar with: shops of similar character in nearby communities; well-known companies supplying equipment; description and specifications of equipment; and recommendations of experienced teachers in the field.

Suggested Equipment Lists. The following equipment lists are based on instructional divisions, general drawing and woodwork, equipped for ten students. In the metalwork and electricity areas the lists are based

on divisions equipped for five students. These lists should prove suggestive in the general shop. Modifications may be made by increasing or decreasing the number of tools for each area.

DRAWING EQUIPMENT

For 10 Students

ITEM	NUMBER
Drawing tables	10
Drawing boards, 18" x 24"	10
T squares, 24" blade	10
Celluloid triangles, 60, 30, 8"	10
Celluloid triangles, 45, 8"	10
Compasses 6"	10
Scales, architect's	10
Set of demonstration drawing instruments	1

WOODWORK EQUIPMENT

For 10 Students

ITEM	NUMBER
Four-pupil benches with rapid acting vises 10"	3
Demonstration bench with rapid acting vise 12"	1
Two-foot rules	5
Try squares 8"	10
Marking gauges	5
Screw drivers, 8"	6
Backsaws 14"	5
Brace, 5" swing	2
Brace, ratchet, 6" swing	2

WOODWORK EQUIPMENT (Cont.)

For 10 Students

ITEM	NUMBER
Set of auger bits 1/4" to 1"	1
Gluepot	1
Compas Saw	2
Compas Saw blades, 14"	4
Ripsaw, 22", 7-point	2
Crosscut saws, 22", 8-point	2
Milter box	1
Saw set	1
Saw vise	1
Jack planes, 14"	10
Block planes, 6"	2
Jointer plane, 22"	1
Spokeshave	2
Cabinet scrapers	2
Hand scrapers	5
Cabinetmakers clamps, 5'	12
Adjustable hand screws, 6", 12" jaw (each)	12
Carpenter's steel square 18" x 24"	2
Steel tape, 6'	2
T-bevel 8"	1
Wing dividers, 8"	2
Set of socket chisels 1/8" to 1"	1
Wood files, 10"	5
Coping Saws	5

WOODWORK EQUIPMENT (Cont.)

For 10 Students

ITEM	NUMBER
Glass cutters (red devil)	1
Mallets (raw hide)	6
Claw hammers (14 oz.)	5
Claw bar	1
Bench brushes	4
Oilstones, 1" x 2" x 8" (double faced)	2
Nail sets, cup point, 3/32"	2
Countersink	2
Hand Drill	2
Set Drills 1/16 to 1/2 in. by 32nds	1
Spirit level	1
Band saw, 14"	1
Tool grinder (motor driven).	1
Universal saw, 10"	1
Jointer, 6"	1

METALWORK EQUIPMENT

For 5 Students

ITEM	NUMBER
Straight snips, No. 8	2
Curved snips	2
Set of grooving tools	1
Cutting nippers	1
Riveting hammer	2
Setting - down hammer	2

METALWORK EQUIPMENT

For 5 Students

ITEM	NUMBER
Machinist's hammers 8 oz., and 12 oz. (each)	2
Scratch awl	3
Set of hollow punches	1
Set of solid punches	1
Cold chisels (assorted sizes)	4
Circumference rule	1
Pliers, Combination 8"	1
Pipe wrench, 8"	1
Stillson wrench, 10"	1
Crescent Wrench, 6, 8, 10, 12 in. (each)	1
Gas furnace	1
Soldering coppers, (1 pr. 1 lb., 1 pr. 1/2 lb.)	4
Files (assorted sizes)	8
Set of rivet set	1
Machinist's vises	2
pipe vise	1
Blowhorn stake	1
Needle-case stake	1
Common square stake	1
Hatchet stake (No. 5)	1
Hollow mandrel (No. 0)	1
Bench plate, 8" x 37"	1
Combination Burring, Turning, Beading machine	1
Bar folder	1

METALWORK EQUIPMENT (Cont.)

For 5 Students

ITEM	NUMBER
Forming roll	1
Bench type Drill Press	1

ELECTRICITY EQUIPMENT

For 5 Students

ITEM	NUMBER
Voltmeter	1
Ammeter	1
Transformers (bell-ringing)	1
Receptacles (Porcelain)	4
Sockets, push button	5
Sockets, snap	5
Sockets, pull chain	5
Doorbells	6
Buzzers	6
Pushbuttons	6
Entrance switch	1
Snap switches (single pole)	1
Snap switches (three point)	1
Lamps, 110-V, A.C., 45-watt	2
Pliers, side-cutting 6"	3
Angle brace	1
Extension bit	1
Blowtorch	1

ELECTRICITY EQUIPMENT (Cont.)

For 5 Students

ITEM	NUMBER
Hack saw frames, adjustable	2
Hack saw blades, 12"	10
S wrenches, 6", 8", 10", each	1
Screw drivers, 3", 6", 8", each	1
Electric meter	1

Each of these equipment lists is not a complete list within itself. Several of the tools listed in one area may be used in other areas. Since small high schools are usually limited on funds, the writer understands that the minimum tools should be suggested for the suggested areas of work.

To develop a standardized list of equipment would be a very difficult task for one to perform. However, a survey, recommended in the following chapter, of all the small high schools in Oklahoma would probably be the most reliable method of obtaining a standardized list of equipment.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This research study has revealed the development of the general shop along with the early development of industrial arts in America. A careful study of the current history of industrial arts indicates that the general shop idea has very rapidly gained popularity.

Summary. This study includes a brief history of the progress of industrial arts from the early development to the present time. The European influences and the early development in America that have been responsible for the present status of industrial arts have been presented.

There are many different industrial arts subjects which may be taught in the general shop. The writer has selected four work areas, general drawing, woodwork, metalwork, and electricity, to be included in the general shop program of a small high school. A schedule, based on ten students, was developed for the four work areas. The first six weeks, of the first semester, all (10) the students will work in the general drawing area. The remaining part of the first semester (12 weeks) all of the students will work in the woodwork area. The second semester will be divided into two nine week periods. The first nine weeks one group of students will work in the metalwork area; while at the same time the other group will work in the electricity area. The second nine weeks the two groups will exchange work areas and proceed as in the preceeding nine weeks period. The suggested equipment lists consists of the minimum quantity of equipment for the proposed work areas. Add-

itional equipment may be purchased as funds are provided.

Recommendations. The material studied in the preparation of this report reveals that the available published information, for those who are interested in the general shop, is rather limited. It is the belief of the writer that there is a great need for more material published by men experienced in the general shop field. For further study the writer suggests that a survey be made of all the small high schools in Oklahoma that offer one or more areas of shopwork, in order to determine the present trend toward the general shop program.

APPENDIX

A SELECTED BIBLIOGRAPHY

BIBLIOGRAPHY

1. Anderson, Lewis F., History of Manual Training and Industrial School Education, D. Appleton and Company, New York, 1926, 253 pages.

2. Bawden, William T., Leaders in Industrial Education, The Bruce Publishing Company, Milwaukee, 1950, 196 pages.

3. Bawden, William T., Industrial Arts in Modern Education, The Manual Arts Press, Peoria, Illinois, 1934, 168 pages.

4. Bennett, Charles A., History of Manual and Industrial Education up to 1870, Charles A. Bennett Company, Inc., Peoria, Illinois, 1926, 261 pages.

5. Bennett, Charles A., History of Manual and Industrial Education, 1870 to 1917, Charles A. Bennett Company, Inc., Peoria, Illinois, 1937, 566 pages.

6. Bennett, Charles A., The Manual Arts, The Manual Arts Press, Peoria, Illinois, 1919, 116 pages.

7. Bonser, Frederick G., and Mossman, Lois, Industrial Arts in Elementary Schools, The Macmillan Company, New York, 1923, 491 pages.

8. Dooley, William H., Principals and Methods of Industrial Education, Houghton Mifflin Company, Boston, 1919, 257 pages.

9. Ericson, Emanuel E., Teaching the Industrial Arts, The Manual Arts Press, Peoria, Illinois, 1946, 384 pages.

10. Ericson, Emanuel E., Teaching Problems in Industrial Arts, The Manual Arts Press, Peoria, Illinois, 1930, 433 pages.

11. Friese, John F., Course Making in Industrial Education, The Manual Arts Press, Peoria, Illinois, 1946, 297 pages.

12. Friese, John F., Exploring the Manual Arts, The Century Company, New York, 1926, 412 pages.

13. Giachino, Joseph W., Course Construction in Industrial Arts and Vocational Education, American Technical Society, Chicago, 1954, 126 pages.

14. Groneman, Chris H., and Fierer, John L., General Shop, McGraw-Hill Book Company, New York, 1954, 307 pages.

15. Johnson, William H., and Fenn, Isadore M., Fundamentals of Industrial Arts and Vocational Education, The Foodhart-Wilcox Co.,

16. Leavitt, Frank M., Examples of Industrial Education, Ginn and Co., Boston, 1912, 330 pages.

17. Newkirk, Louis V., General Shop for Everyone, Health Company, Boston, 1952, 261 pages.

18. Newkirk, Louis V., The General Shop, The Manual Arts Press, Peoria, Illinois, 1929, 190 pages.

19. Newkirk, Louis V., Organizing and Teaching the General Shop, The Manual Arts Press, Peoria, Illinois, 1947, 200 pages.

20. Newkirk, Louis V., The Industrial Arts Program, The Macmillan Co., New York, 1948, 357 pages.

21. Silvius, George H., Teaching Successfully the Industrial Arts and Vocational Subjects, McKnight and McKnight, Bloomington, Illinois, 1953, pages 339.

22. Snedden, David S., Reconstruction of Industrial Arts Courses, Teachers College, Columbia University, New York, 1927, 143 pages.

23. Stombaugh, Ray M., A Survey of Movements Culminating in Industrial Arts Education in Secondary Schools, Teachers College, Columbia University, New York, 1936, 192 pages.

24. Struck, F. Theodore, Creative Teaching, John Wiley and Sons, Inc., New York, 1938, 623 pages.

25. Struck, F. Theodore, Foundations of Industrial Education, John Wiley and Sons, Inc., New York, 1930, 491 pages.

26. Warner, William E., Policies in Industrial Arts Education, Ohio State University Press, Ohio, 1928, 89 pages.

27. Wilber, Gordon O., Industrial Arts in General Education, International Text Book Company, Scranton, Pennsylvania, 1948, 362 pages.

28. Williams, Amos G., Building A General Shop Curriculum, Industrial Arts and Vocational Education Magazine, 30:307, October, 1944.

29. Woodward, Calvin M., The Manual Training School, D. C. Health and Company, Boston, Mass., 1887, 366 pages.

Bulletins

30. State Department of Education, Industrial Arts in Oklahoma, Bulletin No. 105, Oklahoma City, 1951, 129 pages.

31. American Vocational Association, Improving Instruction in Industrial Arts, American Vocational Association, Washington, D. C., 1946, 119 pages.

32. State Board of Education, Course Outline for Industrial Arts, Bulletin No. 1, Richmond, Virginia, 1950, 136 pages.

REPORT TITLE: A Proposed General Shop Program for a Small High School

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Under Direction of What Department: School of Industrial Arts Education and Engineering Shopwork

Scope of Study: This report consists of a proposed general shop program for small high schools. The selected courses or work areas includes, general drawing, woodwork, metalwork, and electricity. An outline of manipulative operations and related content is presented. Also, a minimum list of equipment for the selected work areas, along with the factors in the selection of equipment, is included.

Findings and Conclusions: The general shop program, formerly being utilized more on the junior high school level, is very rapidly gaining popularity in the senior high schools. A well organized and administered general shop program will be successful on any school level in which courses in industrial arts is desired. It is the belief of the writer that this proposed program is best suited to meet the needs of the small high school.

Adviser's Approval C. R. Hill