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Scope of Study: This report deals with the industrial arts curriculum in Newkirk High School, Newkirk, Oklahoma. Courses of study have been constructed for mechanical drawing and woodwork. Floor plans are included that show the physical facilities of the industrial arts department and an inventory showing the cost of equipment is listed.

Findings and Conclusions: 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.

ADVISOR'S APPROVAL C. L. Hall

INDUSTRIAL ARTS IN NEWKIRK, OKLAHOMA

INDUSTRIAL ARTS IN NEWKIRK, OKLAHOMA

by

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INDUSTRIAL ARTS IN NEWKIRK, OKLAHOMA

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MASTER OF SCIENCE

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Andrew Loughridge
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CHAPTER I

INTRODUCTION

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 history of industrial arts in Newkirk, Oklahoma, physical facilities of the industrial arts department, and courses of study for woodwork and drawing.

Needs for the Study. This study has been chosen to be used as an aid in planning the arrangement of equipment and courses of study that will offer students a more desirable form of instruction. The writer feels that this study will be of great personal value, as an aid to becoming a better and more qualified teacher of industrial arts.

Method of Research. The content of this report was obtained from books and magazines in the Oklahoma A. and M. College Library, the writer's personal books, and a personal interview with a former member of the Board of Education in Newkirk, Oklahoma.

Definition of Terms. To clarify the meaning of professional terms used in this report the following definitions are offered:

a. Manual Training

> Any form of constructive work that serves to develop the powers of the pupil through spontaneous and intelligent self-activity is called manual training. 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, patience, and careful application. (8, page 15)

b. 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 skill and hand training of manual training. (11, page 6)

c. Industrial Arts

> Industrial arts is a phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contribution of those engaged in industry. The learnings come through the pupil's experiences with tools and materials and through his study of resultant conditions of life. (9, page 15)

d. Industrial Education

> A generic term including all educational activities concerned with modern industry, its raw materials, products, machines, personnel, and problems. It therefore includes both industrial arts, the general education fore-runner of or introduction to vocational industrial education and the latter also. (5, page 7)

e. 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. (9, page 15)

The writer desires that the reader will use these definitions as a guide throughout this report.

CHAPTER II

HISTORY AND PHILOSOPHY OF INDUSTRIAL ARTS

Industrial education had its beginning centuries ago. The first form was that of securing food and shelter. Writers of educational history are unable to determine the exact time industrial education became a part of school work. At the present time it is a vital and well established part of the educational program.

Part A

Early History

Primitive man recognized the importance of using tools to obtain food and shelter. His education advanced slowly until he began to control and use fire. Since that time there has been a steady advancement in the education and accomplishments of man.

Primitive and Religious Development. Primitive man unconsciously used a form of industrial arts as a means of obtaining food and shelter. His methods were of the trial and error nature. The first important development in industrial arts was when primitive man learned to improvise and use tools. The method of learning was "learn-by-doing".

As the father taught, the son observed his actions and imitated him.

When man began to control and use fire, an important advancement was made in civilization. Bennett states, "Then he was able to cook his food, to smelt metals and shape them into tools, and with these tools engage in crafts unknown and impossible before." (3, page 12)

Man now began to learn by conscious imitation. The development of labor was brought about and workmen formed divisions of labor, and social groups of similar interests were drawn together.

The Jews recognized the value of handiwork as far back as 2000 B. C. Friese states, "The youths went to school to learn law for one half of the day. In Their Talmund was the commission to all fathers to teach their sons a trade in the other half of the day." (5, page 3)

They believed a skillful worker would be a useful member of society. Rabbi Jehuda stated, "He who does not teach his son a trade is much the same as if he taught him to be a thief." (7, page 156)

Outside the monastaries the principal form of education was the apprenticeships. During a seven year indentureship the students were taught a trade by a master craftsman, in conjunction with moral, religious and civic instruction. The apprentice received some compensation for his work. This form of instruction eventually led to the development of the guild system.

The organization of the guilds began in Europe. France had an older and more powerful organization than that in England. The purpose of the guilds was to prevent other citizens from making or selling any product made and marketed by members of the guilds. The organizers of the guilds were shops having a particular trade such as shoemaking, baking, tailoring, bookbinding, and the makers of knives, candles, hats and such items.

Early Advocates. Martin Luther was strongly opposed to the type of education given in the monastic and ecclesiastical schools. He compared them to prisons. Luther advocated that the right of schooling be given to all the people, regardless of their social standing. "My opinion," said Luther, "is that we must send the boys to school one or two hours a day, and have them learn a trade at home for the rest of the time." (3, page 31)

The schools became more comprehensive than those of the Jews. The curriculum included Hebrew, Latin, Greek, mathematics, logic, music, and, to some extent, history and science.

Rabelias, being interested in industrial occupation, was one of the first to place the practice of industrial arts in the educational system. The connection between realism and industrialism are illustrated in his educational views.

The most important writer in the educational field

during the seventeenth century was John Amos Comenius. One of his contributions to industrial arts is his exposition of the "method of arts". This was an analysis of the teaching of handicraft through apprenticeship. He proposed a system of education that divided the first twenty-four years of a student's life into four periods of six years each. Industrial education is provided for in at least three of the periods. Comenius stated:

> Here skill in action is to be associated with knowledge of things, without this skill even he whom knows much about things will be awkward in dealing with them; ..... No one will be graduated from this institution who is not well trained in those occupations which demand care and circumspection. (1, page 15)

In the latter part of the seventeenth century August Herman Francke founded a school to provide religious education for the poor. The school progressed until it developed into a great institution, including a Latin school for the wealthier class of people.

The curriculum contained several manual arts, including spinning, sewing, knitting, turning lathes and an apparatus to cut glass. Francke observed that, "Children of their own accord are always busy at building and working, and that this may very easily be turned to some useful end by a teacher." (3, page 76)

A writing called Emile, by John Jacques Rousseau, caused an upheaval in educational thinking in the eighteenth century. His critical and outspoken writings caused him to leave France to avoid being arrested. Rousseau probably did more

for the field of industrial arts than any other leader before his time. Bennett states: "His recognition of the fact that manual arts may be a means of mental training marked the beginning of a new era in education." (3, page 81)

Rousseau, being unable to put his theory into practice, prepared the way for Pestalozzi.

Pestalozzi has been called the "father of manual training". His primary interest was that of offering some form of industrial education to the poor. He believed the training of the child should be in the home during his early years. The Industrial Revolution in Switzerland caused him to see the necessity for schools. He wrote:

> The end which we should hold before ourselves in training the children of the lowest classes is to enable them without capitol of any kind, not only to find the means of subsistence wherever their lot may be cast, but also to practice several different kinds of crafts. (1, page 85)

The son of one of Pestalozzi's friends, Emanuel Fellenberg, was one of the most influential men of his period. The Fellenberg Institute had a great influence on manual arts in the early nineteenth century. His schools were designed for the poor as well as the rich. He thought this would cause a feeling of respect between the classes. The students' work was that of farming until they were old enough to select a trade. The students worked on a specific trade until they became twenty-one and left the school.

The Swedish Sloyd System. Otto Salomon did the most toward developing the Swedish Sloyd. In 1872, he helped

establish a sdhool in Naas, which is about fifty miles from Stockholm. The school was opened for children ten to fourteen years of age.

The objects made were to be used in the home. Boys were prohibited from making fancy diversions of the actual objects. Woodwork was looked upon with the greatest favor of the various kinds of work taught. The chief objectives of Sloyd as given by Salomon are as follows:

1. To cause the child to acquire a general skill of hand.
2. To awaken in him the taste and love of labor.
3. To call forth spontaneity -- the initiative.
4. To give him experience of fact that order and correctness in labor are necessary elements of progress.
5. To develop the faculties of attention and perception.
6. To render the child earnest and preserving.
7. To inspire the esthetic sentiment without allowing it to become vague or exaggerated.
8. To neutralize the injurious effects produced upon the system by intellectual studies, and the sitting position which the child must maintain during the ordinary lessons. (10, page 24)

The Russian System. In 1868, a Technical Institute was founded in Moscow, Russia. The purpose of the institution was to train engineers and skilled workmen to build railroads. The instruction was of a formal nature, and consisted of a series of exercises that the workman would encounter on the job. Most of the projects were of no intrinsic value. However, some of the jobs were production work on articles

to be used by the railroad.

Part B

Industrial Arts in America

The European influence was evident in the early American schools. The method of instruction being that of the Sloyd and Russian systems. The European settlers contributed their ideas to the American form of instruction. The result of new ideas and practices contributed to an advancement in general education.

Manual Training. One of the most significant factors in the establishment of industrial arts in America was the Russian Exhibit at the Centennial Exposition in Philadelphia in 1876. Two American educators, Dr. John Runkle, President of Massachusetts Institute of Technology, and Professor Calvin M. Woodward, dean of the Polytechnic School, Washington University, visited the exhibit and were greatly impressed by it. The Russian system had a significant influence on the type of instruction given in America. In 1880, Washington University opened the St. Louis Manual Training School, under the direction of Professor Calvin M. Woodward. As a result of this school, manual training was introduced into more than fifty public high schools. By 1900, this number had more than doubled.

The Morrill Act of 1862. A very important contribution to the industrial and agricultural classes of society was a

bill introduced by Senator Justin S. Morrill. The bill was vetoed by President Buchanan, in 1859, after passing both houses. It was introduced again and signed by President Lincoln in 1862.

The act granted an amount of public land, equal to thirty thousand acres per senator and representative in Congress, to several states for the purpose of establishing colleges of agricultural and mechanical arts. The following is a quotation from the act:

> The money derived from the sale of these lands was to be appropriated to the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life. (1, page 152)

The Adoption of the Russian System. In his annual report to the Board of Education of Massachusetts, in 1877-78, Runkle wrote: "The method is not only educational, but it constitutes the only true and philosophical key to all industrial education." (4, page 321) As a result of Runkle's report, the School of Mechanic Arts was established in Boston for boys under fifteen years of age. There was a charge of one hundred and fifty dollars a year for tuition.

This observation was made by Woodward concerning the Russian System:

> 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. (4, page 322)

The following is a statement pertaining to the Russian System by Friese: "This system of tool instruction was not adopted in its entirety by the United States largely because the physical products of the work were mostly quite valueless and because they failed to catch the interest and imagination of American youths." (6, page 44)

A great number of characteristics and practices can be traced to the present programs of industrial arts, as stated by Friese:

> The course of study was based on occupational analysis.
>
> Courses were built on the principle of working from the simple to the complex.
>
> Subject matter was organized for teaching purposes.
>
> Teaching methods were developed.
>
> Pupils were trained in groups rather than singly.
>
> Progress of the pupils can be determined at any time.
>
> Both individual tool sets and benches and general tools were included in the equipment.
>
> Pupils worked from drawings they had previously made.
>
> Separate shops were established for the different equipments or trades.
>
> Models and charts were hung on the walls of the shops.

> The time required for learning a trade was shortened from that required under apprenticeship.
>
> The accuracy required increased as the course progressed.
>
> One model was completed before another was begun. (6, page 44)

Influence of Swedish Sloyd. Because of the lack of pupil interest that existed under the Russian System, attention was turned to sloyd. In 1888, the Sloyd Training School was established in Boston by Mrs. Quincy Shaw. The school was under the direction of Gustaf Larsson, a former student of Otto Salomon. The institution was eventually taken over by the Boston school system.

Teachers were required to have certificates to teach sloyd. The requirements for a certificate are listed below:

> 1. The satisfactory completion of twenty-five models (later increased to thirty-one).
>
> 2. Proof of ability to make and use working drawings, and skill in the sharpening and use of tools.
>
> 3. Evidence of teaching ability.
>
> 4. A short essay on the theory and educational value of manual training written in class. (4, page 472)

The following is a summary of the influence sloyd had on American educational handwork, as stated by Friese:

> The concept of formal discipline, including the transfer of training was a part of the philosophy underlying sloyd.
>
> The useful model of intrinsic value and boy interests followed preliminary practice work of the exercise type.

> Mechanical drawings of the object made were drawn by the pupils.
>
> Aims were established which contributed to general education.
>
> Cultural values were recognized.
>
> The normal instincts, interest and activities of early adolescence were recognized and capitalized upon in the development of new teaching methods.
>
> The practice of making notes, sketches, and lists of operations in a notebook was inaugurated.
>
> All pupils did not make the same problem at the same time, some choice in the selection being permitted.
>
> Class instruction was supplemented by individual instruction. (6, page 45)

Manual Arts. In the early part of the twentieth century, a change was partially brought about by John Dewey, concerning emphasis placed on manual training. A result of this change allowed students to select and design their own projects. This was the beginning of manual arts. However, no distinctive line can be drawn between the earlier term, manual training, and manual arts. The first official use of the term "manual arts" was in the naming of the Macy Manual Arts Building of Teachers' College, New York, by Charles A. Bennett. Bennett classifies manual arts in five groups, "graphic, mechanic, plastic, textile, and bookmaking arts". (4, page 16)

The field of manual arts has expanded and attracted more interest in recent years. In 1904, Charles R. Richards wrote an editorial that was published in The Manual Training

Magazine, in which he suggested the term "industrial arts" be used instead of "manual training". The influence of manual arts as given by Friese is:

> The designing of problems made in the school shop became an important part of the work.
>
> With the above step added, our educational handwork developed and embarked upon the "project method" as a new departure in educational methodology.
>
> The beginnings of the extension of school shop-work into other trade, industrial, and craft fields than woodwork and iron work were made, as is inducated by the fact that "arts" means several skilled hand-working occupations. (6, pages 47-48)

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 and auto mechanics. 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 college.

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. Consumers' knowledges and appreciations
E. Household mechanics
F. Social habits and attitudes

G. Pre-vocational purposes

H. Avocational purposes

I. A degree of skill

J. The seven cardinal principles

K. Mechanical intelligence

L. Correlation with other subjects

M. Developing the "faculties"

N. Coordinating the "hand and eye"

O. Vocational training (11, page 34)

Newkirk's Objectives. Newkirk's objectives are:

The general industrial arts content includes the basic areas of woodworking, metalworking, 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 suitable for hobby interests.

8. Giving social experiences that will develop

understanding and ability to work effectively with others. (9, 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. (12, 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." (9, 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. (9, page 19)

The number of general shops has increased rapidly in the last ten years. To be properly prepared to teach general shop, the industrial arts teacher should have courses in drawing, foundry, electricity, sheet metalwork, woodwork, plumbing, printing, forging, concrete work, auto mechanics, finishing and design.

Part D

A History of Industrial Arts in Newkirk, Oklahoma

The material contained in this chapter covers the development of industrial arts in Newkirk from its beginning in 1920 to the present time. The information presented was obtained from the Newkirk school records and a personal interview with a former clerk of the school board, who served in this position from 1914 to 1956.

History. An election was held by the Newkirk Board of Education in 1919, at which the city voted bonds for the construction of a manual training building. The accepted bidder was unable to raise bonds to begin construction. On February 2, 1920, a contract was signed to construct the building for a sum of $1,500.00.

The first instructor was Merle C. Paynter, who taught manual training from 1920 until 1923, when he resigned to enter business. He was followed by Dave G. Fisher who taught until December 1924. He was replaced in January, 1925, by Mark Brooks who finished the remainder of the term. He was followed by C. L. Clodfelter, who taught during the year 1925-1926. He was followed by Olin H. Wilson, who taught from 1926 until 1929. Arnold Umbach was employed during the year 1929-1930 as manual training instructor and coach. Ray. O. Baird was employed to teach manual training and agriculture in 1930, he remained in this position until 1934. He was

followed by R. W. Kaews who taught during the year 1935-1936. He was followed by Delbert Dyke who taught from 1936 until 1938. During this time the name manual training was changed to industrial arts. The next instructor was Richard Kisner who taught from 1938 until 1941. He was followed by Leonard T. Ninman who taught from 1941 until 1943. In 1943 C. E. Cowles was employed as industrial arts instructor and remained until 1955, when he reached the retirement age. He was replaced in 1955 by Andrew Loughridge who is employed at the present time.

In the summer of 1952 the industrial arts department was moved into the basement of the old high school, and the former building was occupied by the agriculture department. In December 1956 the industrial arts department moved into a part of the new addition to the high school, that was designed for industrial arts classes. The agriculture department moved into a new building and the old manual training building was sold at public auction.

Since the beginning of industrial arts in 1920 the courses being offered have consisted of mechanical drawing and woodwork. The courses offered in industrial arts at the present time consist of one year of mechanical drawing, one year of hand woodwork, and two years of machine woodwork.

Philosophy. At the December meeting in 1953 the Newkirk Board of Education adopted a set of policies and regulations. Contained in the policies and regulations is the philosophy

and objectives of the school in relation to general education. A statement of the philosophy is as follows:

> Education should prepare students for complete living, that is, complete harmonius living by participating intelligently in the various activities of living. School is not "preparation for life" but is living in its broadest sense. Education should prepare students to secure the fullest satisfaction of human "wants". It should teach students to realize that many human "wants" are satisfied, not by getting the advantage but by giving his utmost to secure human decency, tranquil living, peace of mind and financial security not only for himself, but for others as well. What we get out of life depends upon what share we put into it.
>
> Objectives. The objectives of the Newkirk Public Schools are:
>
> (a) To help all persons develop their capacities to the highest degree possible to the end that they may become an effective member of society.
>
> (b) To help all students to:
>
> 1) learn to think honestly
> 2) judge fairly
> 3) make safe conclusions
> 4) solve individual problems
> 5) evaluate things correctly
> 6) contribute to the needs of the time
>
> (c) To assist young people to be more humane to their fellowmen; and to prepare them to participate in those affairs that are of abiding concern to mankind.
>
> (d) To develop qualities of character which are of special significance in a democracy.
>
> (e) To develop the ability to use the most effective and reliable methods in searching for truth as a basis for discovery and a solution to problems.
>
> (f) To provide experiences that will help students gain the fundamental skills required by all and to provide for enrichment of adult life. (14, page 6)

Teachers should establish objectives and encourage students to work toward a definite goal. Poor teaching may result if aims and objectives are neglected. The objectives of industrial arts are closely related to those of general education, and will be discussed in the next chapter.

CHAPTER III

PHYSICAL FACILITIES AND COURSES

The courses contained in this chapter have been prepared to use as a guide for teaching mechanical drawing and woodwork, and are designed for senior high school as no industrial arts is offered in junior high school at the present time. Also included is an inventory of equipment, floor plans, and the layout of equipment in the industrial arts shop and drawing room.

Part A

Physical Facilities

An attempt will be made to explain the physical facilities of the industrial arts department of Newkirk High School. Two drawings are included to help present a clearer picture. Different areas of the shop are designated and dimensions are shown in one plan and equipment in the shop and the drawing room is presented in another. This is followed by a complete inventory of all equipment.

Floor Plans. The industrial arts department, Fig. 1, page 24, of Newkirk High School is located in the north end of the new addition to the high school. The department is well

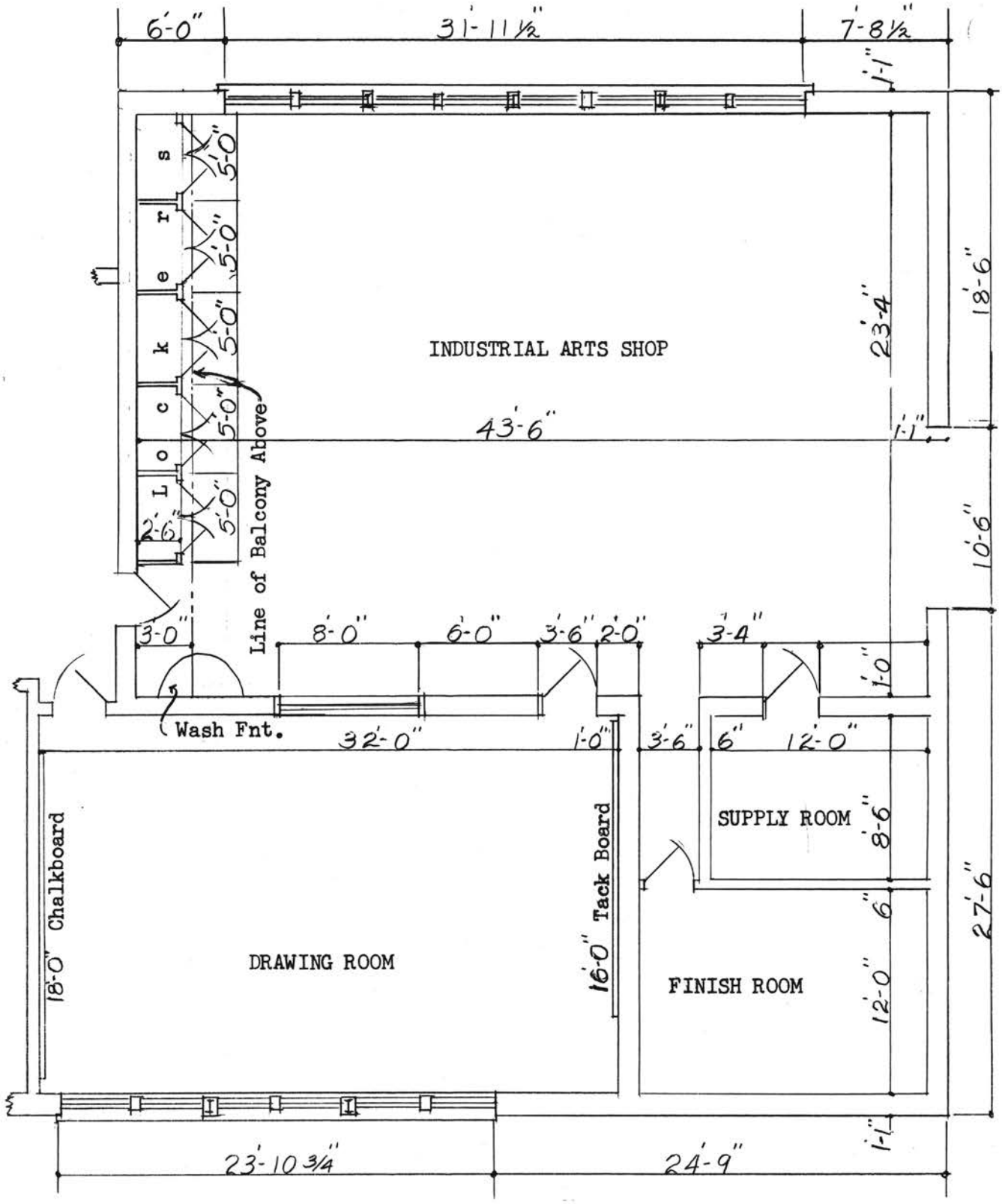

FIGURE 1

FLOOR PLANS OF THE INDUSTRIAL ARTS DEPARTMENT OF NEWKIRK HIGH SCHOOL

located, in the respect that noise made by machines does not interfere with classes in other parts of the building. The rooms are well lighted and are equipped with dual purpose heaters, that may be used as fans to provide adequate heat and ventilation. A glass partition in the wall separating the drawing room from the shop enables the teacher to observe activities in both rooms. The floor in the drawing room is concrete overlaid with linoleum blocks. All other floors are concrete finished with floor seal to make cleaning easier.

The floor plan shown in Fig. 1, page 24, is a reproduction of the original plans of the industrial arts department as submitted by the writer and drawn by the architect. This area consists of four rooms: The woodshop, drafting department, finishing room, and a storage room. The arrangement of equipment in those rooms are shown in Fig. 2, page 26.

Layout of Equipment. The arrangement of equipment as shown in Fig. 2, page 26, is an important factor in the efficiency of any industrial arts program. Instructors should be familiar with working procedures and arrange machines so that students may move from one machine operation to another with the least amount of confusion. A careful study was made to determine the arrangement of equipment in the available space provided in the new location, particular attention was given in locating machines in areas where they would be easily accessible and efficiently used.

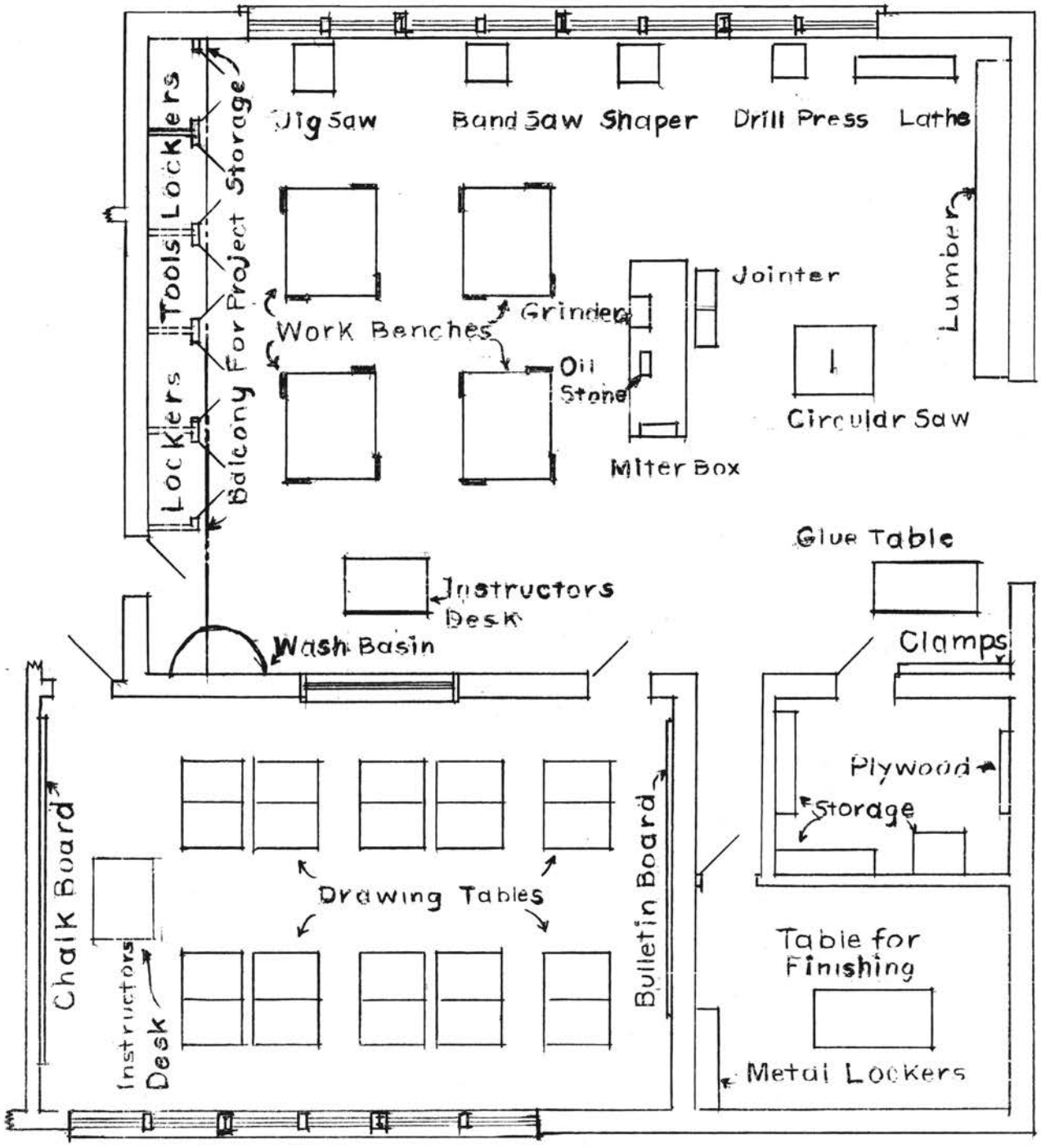

FIGURE 2

LAYOUT OF EQUIPMENT IN THE INDUSTRIAL ARTS DEPARTMENT OF NEWKIRK HIGH SCHOOL

A balcony constructed above the student lockers provides ample storage space for projects. The tool panel is located close to the work area to keep the amount of travel to a minimum when tools are needed.

Drafting tables are arranged in the drawing room to receive the maximum amount of light and allow easy passage of the students and teacher about the room.

Inventory and Cost of Equipment. All teachers are required to submit an inventory to the superintendent at the close of each school year. The inventory that follows is a complete list of equipment in the industrial arts department of Newkirk High School. The cost of equipment is presented in this report so that its readers may realize the expense involved in equipping a shop.

INVENTORY AND COST OF EQUIPMENT

INDUSTRIAL ARTS

Quantity	Description	Cost each	Cost total
1	Air compressor, complete with hose and spray gun.	53.37	53.37
1	Anvil	35.50	35.50
2	Awl	.80	1.60
4	Bench, woodworking with vises	217.86	871.44
1	Bench, for gluing	15.00	15.00
1	Bench, for finishing.	12.00	12.00
1	Bench, for grinders and miter box	20.00	20.00

Quantity	Description	Cost each	Cost total
2	Bench grinder	60.00	60.00
14	Bench stop.	.35	4.90
2 sets	Bits, auger	14.50	29.00
1 set	Bits, twist drill	13.04	13.04
1	Bit, expansive.	2.55	2.55
2	Bit braces.	9.85	19.70
1	Bit, screwdriver.	.60	.60
1	Book shelves.	10.00	10.00
20	Books, machine woodwork . . .	3.00	60.00
19	Books, hand woodwork.	3.60	55.40
13	Books, project plans.	2.50	32.50
22	Books for reference	3.50	77.00
2	Brushes, paint.	.65	1.30
7	Brushes, bench.	1.10	7.70
1	Burnisher	1.15	1.15
1	Cabinet for tools	20.00	20.00
1	Cabinet for screws and small parts	12.00	12.00
2	Caliper, outside.	2.80	5.60
1	Caliper, inside	2.80	2.80
1	Can oily waste.	9.45	9.45
2	Can oil	.85	1.70
8	Chisel, socket.	2.65	21.20
1 set	Chisel, wood turning.	18.40	18.40
12	Clamps, "C"	2.75	32.00
16	Clamps, 12 in. hand screw . .	4.45	71.20

Quantity	Description	Cost each	Cost total
6	Clamps, 6 in. hand screw . . .	2.90	17.40
10	Clamps, 6 ft. bar.	6.00	60.00
8	Clamps, 4 ft. bar.	6.30	50.40
1	Countersink, brace type. . . .	.85	.85
1	Countersink, drill type. . . .	.50	.50
1	Desk, teachers	75.00	75.00
1	Draw knife	3.25	3.25
2	Dividers	2.80	5.60
2	Drill, hand.	10.95	21.90
1	Drill, ¼ electric hand	33.50	33.50
1	Drill press, 14" with mortising attachment	97.50	97.50
4	Raceplate, lathe	2.25	9.00
1	Fire extinguisher.	15.00	15.00
4	File, card	1.55	6.20
6	File, wood	1.00	6.00
3	File, round.	1.30	3.90
6	File, saw.	.60	3.60
1	File, square	1.20	1.20
1	File, flat	1.00	3.00
4	File, flat vixen	3.35	13.40
1	First aid kit.	6.50	6.50
1	Glue heater.	25.00	25.00
2	Gouge.	3.05	6.10
1	Goggles.	2.50	2.50
1	Hacksaw.	2.30	2.30

Quantity	Description	Cost each	Cost total
2	Hammer, claw.	3.75	7.50
2	Hammers, ballpein	2.80	5.60
4	Hammers, rawhide.	1.50	6.00
1	Hammer, rubber.	1.50	1.50
1	Jointer, 6"	130.00	130.00
1	Lathe	225.00	225.00
1	Letter set.	8.55	8.55
1	Level 24"	5.35	5.35
1	Level 18"	3.00	3.00
6	Marking gage.	2.35	14.10
1	Miter box and saw	60.00	60.00
1	Multi oil stone	15.00	15.00
2	Nail set.	.35	.70
18	Plane jack.	7.70	138.60
2	Plane, block.	5.25	10.50
1	Plane, circular	20.60	20.60
1	Plane, rabbet	6.60	6.60
1	Plane, Stanley 45	38.60	38.60
1	Plane, hand router.	8.80	8.80
1	Plane, smooth	7.35	7.35
1	Plane, Fore	11.90	11.90
1	Plane, jointer.	14.35	14.35
1	Pliers, combination	.95	.95
1	Plug cutter 3/8	3.05	3.05
1	Points, trammel	1.95	1.95

Quantity	Description	Cost each	Cost total
1	Router 3/4 hp. hand electric .	56.00	56.00
4	Router bits.	1.05	1.05
1	Sander, portable belt.	150.00	150.00
1	Sander, electric hand oscilating	52.50	52.50
11	Saw back	5.10	56.10
2	Saw hand rip	6.95	13.90
2	Saw, hand crosscut	6.55	13.10
2	Saw, coping.	.82	1.64
1	Saw, compass	1.10	1.10
1	Saw, band 14".	348.35	348.35
1	Saw, circular 10" tilting arbor.	432.40	432.40
1	Saw, blade, 10" combination. .	3.50	3.50
1	Saw, blade, 10" rip.	3.50	3.50
1	Saw, blade, 10" crosscut . . .	3.50	3.50
1	Saw, dado head for circular saw.	17.85	17.85
1	Saw set, hand.	2.10	2.10
1	Saw, jig, 24".	166.95	166.95
5	Screwdriver.	1.35	6.75
3	Scraper, flat hand	.40	1.20
6	Scraper, cabinet	3.30	19.80
1	Shaper	160.00	160.00
1	Spokeshave	1.40	1.40
2	Square, framing.	3.25	6.50
2	Spare, foot.	2.30	4.60

Quantity	Description	Cost each	Cost total
5	Square, combination.	1.95	9.75
2	T-bevel.	2.45	4.90
2	Tin snips.	4.80	9.60
10	Try-Square	1.90	19.00
1	Vacuum cleaner	89.00	89.00
1	Wrench, Allen set.	2.00	2.00
1	Wrench, crescent 10"	2.25	2.25
1	Wrench, pipe	4.15	4.15
1	Wrench, open end	1.30	1.30
2	Wrecking bar	2.20	4.40
	MECHANICAL DRAWING		
1	Desk, teachers		
20	Drafting tables.	25.00	500.00
12	Scale.	.60	7.20
10	T-square	.84	8.40
9	Triangle	.54	4.86
1	Pencil sharpener	2.45	2.45
		TOTAL:	$4,973.10

The prices listed in the inventory are the current prices, and is not the original cost of the equipment. Even though all equipment is not new, it is in good working condition. In the last two years approximately $1,400.00 has been spent for repair of equipment, the purchase of new hand tools, drafting tables, work bench tops and a circular

saw.

In part B are the objectives for industrial arts in general, and for mechanical drawing and woodwork specifically. Following the objectives suggested courses of study will be presented for those two areas.

Part B

Courses

In preparing the following courses for drawing and woodwork, the writer has attempted to present material that will be appropriate for the age, background, grade level of the students and facilities of the school. The outline of the courses is tentative and adjustments may be made as the need arises. A list of the objectives for industrial arts follows.

Objectives of Industrial Arts. A list of objectives for industrial arts are presented as formulated by a committee of the American Vocational Association. The objectives are:

> 1. Interest in Industry. To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.
>
> 2. Appreciation and Use. To develop in each pupil the appreciation of good design and workmanship and the ability to select, care for, and use industrial products wisely.
>
> 3. Self-realization and Initiative. To develop in each pupil the habits of self-reliance and resourcefulness in meeting practical situations.
>
> 4. Cooperative Attitudes. To develop in each

pupil a readiness to assist others and to join happily in group undertakings.

5. Health and Safety. To develop in each pupil desirable attitudes and practices with respect to health and safety.

6. Interest in Achievement. To develop in each pupil a feeling of pride in his ability to do useful things to develop worthy leisure-time interests.

7. Orderly Performance. To develop in each pupil the habit of an orderly, complete, and efficient performance of any task.

8. Drawing and Design. To develop in each pupil an understanding of drawings and the ability to express ideas by means of drawing.

9. Shop Skills and Knowledge. To develop in each pupil a measure of skill in the use of common tools and machines and an understanding of the problems involved in common types of construction and repair. (13, Page 18)

Section 1

A Suggested Course of Study for First Year Drawing

The following course of study is designed for a tenth grade drawing class. A sufficient amount of material is contained in the course for two semesters work. The content of the course is varied to meet the needs of the students. The faster students are to be assigned more complex problems, but should be of the same nature of those assigned to slower students.

Objectives of Mechanical Drawing. A list of objectives suggested for mechanical drawing will be stated at this time, the objectives read:

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 drawings.

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. (13, page 46)

Text. This course of study is based on the text, Mechanical Drawing, Sixth Edition, by Thomas E. French and Carl L. Svensen.

Outline of Drawing Course

Unit of Learning	Reference Page	Problem	Page
Language of drawing	1-2		
Theory of shape and size, description, placement of views	34-50 81-89		
Sketching, isometric to orthographic	51-55	Fig. 5.7	56
	"	Fig. 5.8	57
	"	Fig. 5.9	58
	"	Fig. 5.10	59
Supply the missing line and sketch to isometric	51-55	111	294
Teach unit on the use and care of drawing instruments, paper size, layout and lettering	3-19	44-47	282
	20-31	52-55	282

Unit of Learning	Reference Page	Problem	Page
Graphic Solutions	200-209	13	279
	"	16-17-21-22-24-26.	280
	"	30-34-36-37-42	281
Shape description, complete the views	33-50	65-68	287
	81-99	75-78	289
	"	87-90	290
	"	97-100	292
	"	105-108	293
	"	119.	299
Half section	60-65	143	308
Full section	"	147	310
Full section	"	152	312
Revolved section	"	153	313
Auxiliary views	70-76	156-157	314
	"	161-162	314
	"	173	320
Revolutions	77-79	177	323
	"	181	323
Developments	321-327	439-433-445	394
	"	456	396
Pictorial Drawing	148-157	326-327	372
Isometric	"	356-357	379
Isometric	"	347	376
Isometric	"	358	380
Oblique	158-160	371-372	386
Cabinet	160	287	353
Perspective	161-165	376-383	388
Furniture Drawing	149-156	286	353
	"	291	355
	"	293	356

Grading. Individual drawings turned in by the students will determine approximately three-fourths of the grade. Factors determining the grade for the drawings are:

1. Neatness 20 points
2. Accuracy 40 points
3. Legibility 30 points

4. Speed 10 points

In order to have a perfect paper all of the above requirements must be met. Students will be required to repeat work that is handed in dirty, crumpled, decidedly inaccurate, or shows poor workmanship due to carelessness.

Tests will be given at intervals throughout the course, and will constitute approximately one-fourth of the final grade.

Section 2

A Suggested Course of Study for Hand Woodwork

This course in hand woodwork is to be offered to tenth grade students, or students not having any previous experience in woodwork. It is recommended that students not having any previous mechanical drawing, take drawing in conjunction with the course.

Objectives of Woodwork. The following list of objectives are intended for both hand woodwork and machine woodwork. The objectives read:

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

2. Use these skills in making projects or repairs which will give personal 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. (13, page 51)

Cooperation of the students and the teacher is the first step in achieveing established objectives. Students should be informed early of the requirements pertaining to the course. The proper management of class organization is important in attaining desired objectives, and will be discussed later.

In the following outline "A" in each "Unit" of instruction indicates the manipulative work to be included in that unit. Related information and material is included in part "B". In the columns to the right of each unit of instruction is the page number in the reference book which corresponds to that particular unit.

Text. The text to be used in this course is Units in Hand Woodworking, by J. H. Douglass and R. H. Roberts. Other books to be used in conjunction with the text are:

1. General Shop Bench Woodworking, by Verne C. Fryklund and Armand J. La Berge.
2. A Manual for Hand Woodworking, by DeWitt Hunt.
3. Industrial Arts Woodworking, by John L. Feirer.

Outline of Hand Woodworking Course

Outline of Instructional Units	1 D & R	2 F & La	3 Hunt	4 Feirer
Unit 1 - Beginning the class				
A. Explain course and make assignment.				
B. Take students on a tour of the shop				
Unit 2 - Planing stock to size				
A. Disassembling and assembling a plane,	45	21	13	54
Planing a working face and working edge	48	23	28	59
B. Sizes kinds and uses of different planes	46	23	28	59
Unit 3 - Using the grinder				
A. Grinding edge tools	44		83	188
B. Honing edge tools	45			190
Unit 4 - Planing continued				
A. Planing ends	47	24	11	66
Planing to width and thickness	52	20	10	61
B. Care and use of vise and bench stops, bench hooks and brushes				
Unit 5 - Layout tools				
A. Use of layout tools	16	16-25	34	37
B. Some uses of the framing square	55		30	45
Unit 6 - Rounding corners				
A. Trimming With a chisel	75	42	50	102
B. Sanding corners	59			
Unit 7 - Chamfers				
A. Laying out	54	32	19	98

Outline of Instructional Units	1 D & R	2 F & La	3 Hunt	4 Feirer
B. Chamfering edge and end	54			99
Unit 8 - Boring holes				
A. Locating centers			39	114
B. Boring holes	62	34	41	115
Unit 9 - Sandpaper				
A. Finishing surfaces of wood preparatory to assembling and finishing	105	54	46	163
B. How sandpaper is manufactured and sold	105	54	46	161
Unit 10 - Making a bill of material				
A. Read a working drawing and make a bill of material	24 32	12 15	 60	15 18
B. Selecting and designing a project		98		14
Unit 11 - Hand saws				
A. Correct method of using	40	16	5	49
B. How to sharpen	38	48	200	51
Unit 12 - Laying out and cutting material				
A. Measuring	28	18	2	43
B. Cutting to width and length	28	16	1	43
Unit 13 - Glue				
A. Kinds of glue	91	106	201	73
B. Application	95	70	185	80
Unit 14 - Making curved designs				
A. Laying out	56	30	92	84
B. Transferring designs	56	30	92	84

Outline of Instructional Units	1 D & R	2 F & La	3 Hunt	4 Feirer
Unit 15 - Using nails				
A. Driving and drawing nails	69	38	67	152
B. Sizes and kinds of nails	69	103	64	150
Unit 16 - Hand drill				
A. Sizes of drills			41	116
B. Using the drill	68	37		118
Unit 17 - Screws				
A. Kind and use	64	40	72	156
B. Use of screws	66	41	73	158
Unit 18 - Geometric designs				
A. Laying out simple polygons	30	29		86
B. Laying out an ellipse	30	30		87
Unit 19 - Dado joint				
A. Laying out and making the dado joint	77	56	77	127
B. Tools required	82	57	78	128
Unit 20 - Rabbet joint				
A. Laying out and cutting	82	58	84	125
B. Uses of the rabbet joint	77	58		124
Unit 21 - Mortise and tenon joint				
A. Laying out and cutting mortise	85	60	100	138
B. Laying out and cutting tenon	85	62	100	137
Unit 22 - Dowel joint				
A. Making edge joints	80	64	199	120
B. Making end joints	81	65		123

Outline of Instructional Units	1 D & R	2 F & La	3 Hunt	4 Feirer
Unit 23 - Miter joint				
A. Cutting a miter joint		67		133
B. Assembling a miter joint		68		135
Unit 24 - Assembling projects				
A. Trial clamping	93			166
B. Clamping and gluing	94			167
Unit 25 - Fastening a table top				
A. Locating and fastening a table top	88	73	130	143
B. Kinds of fasteners	88	73	130	143
Unit 26 - Setting hinges				
A. Locating hinges and drilling holes	99	77	192	170
B. Types of hinges	96			
Unit 27 - Making a drawer				
A. Fitting and constructing a drawer	87	75	136	145
B. Drawer slides	88		140	142
Unit 28 - Stains and fillers				
A. Stains and their application	109	82	174 183	177
B. Fillers, liquid and paste	115	85	172	179
Unit 29 - Finishing				
A. The use of shellac	117	86	168	180
varnish	118	86	168	180
lacquer	121	91	167	183
enamel	112		159	184
B. Polishing abrasives				
use of wet or dry sandpaper	105	94	46	176
steel wool	106	95		176
pumice and rottenstone	106	93	46	176

Outline of Instructional Units	1 D & R	2 F & La	3 Hunt	4 Feirer
Unit 30 - Lumbering				
A. How lumber is sawed and dried	7...11	12	4...15	3.....25
B. Plywood, how it is made and used	22...	127	.....	238

Students enrolled in hand woodworking are expected to perform all operations with hand tools whenever possible, however, edge jointing for glue joints may be done on the jointer, after obtaining permission from the teacher. Jack planes are assigned to students, and are kept in drawers in the work benches, other tools are kept in a tool panel. In order that misplaced tools may be easily detected at the close of each class a silhouette is painted behind where each tool belongs.

Section 3

A Suggested Course of Study for Machine Woodworking

This course of study is designed for two years machine woodwork. Part "A" is to be offered as a beginning course and part "B" as an advanced course.

In part "A" a number of simple machine processes is offered along with related information pertaining to the course. After receiving proper instructions and observing demonstrations, students will be required to pass a written examination before operating any machines.

It is desired that students who enroll in the course, have completed a year of mechanical drawing and a year of hand woodwork, and be a junior or senior in highschool.

Part "B" is a continuation of part "A", with emphasis placed on offering as many advanced machine operations as possible. Students are expected to make projects of a more complex nature and assist in the maintainance of equipment. The information gained in helping maintain shop equipment should prove of value to students in caring for equipment in home work shops. Students enrolling in the course should have completed one year of machine woodwork and be a senior in high school.

In the following outline "A" in each "Unit" of instruction indicates the manipulative work to be included in that unit. The accompanying material is included in part "B" and machine exercises and related information is included in part "C", if there is a part "C".

Text. The text to be used in this course is Machine Woodworking, by Robert E. Smith. Other books that will be used are:

1. Machine Woodworking, by Herman Hjorth
2. Advanced Woodwork and Furniture Making, by John L. Feirer

Outline of Machine Woodworking Course

Part A

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
Unit 1 - Explanation of course			
A. Requirements			

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
B. Assigning work stations			
Unit 2 - Selecting a project			
A. Intended use of project			11
B. Kind of wood to use			12
Unit 3 - Planning a project			
A. Reading and making a working drawing			44
B. Planning procedure of work and calculating board measure			42
Unit 4 - Getting out stock			
A. Cutting to rough width and length	82-84	43-55	67
B. Changing Saw blades	82	42	167
Edge jointing	112	128	246
Unit 5 - Gluing large surfaces			
A. Determining direction of grain			73
B. Gluing and clamping			73
Unit 6 - Using the grinder			
A. Grinding edge tools	66		
B. Grinding drills	76		
Unit 7 - Cutting rails			
A. Cutting duplicate parts	125	70	
B. Using a clearance block	86	55	178
Unit 8 - Making table legs			
A. Gluing face to face			74
B. Squaring working face and working edge		131	
Unit 9 - Panel construction			
A. Kind of joints			103

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
B. Treating the edge of plywood			105
Unit 10 - Using the lathe			
A. Centering stock to be turned	18	241	
B. Turning tools	14		320
sanding	56		350
Unit 11 - The dado joint			
A. Laying out and cutting the dado	91	58	199
B. Different kinds of dado joints			91
Unit 12 - The mortise and tenon joint			
A. Making the mortise	128	229	99
B. Making the tenon	87	67-101	98
Unit 13 - Cutting curves			
A. Cutting on the bandsaw	104	90	220
B. Cutting on the jig saw	110	109	237
Unit 14 - Using the belt sander			
A. Sanding flat surfaces	144		316
B. Sanding curves	145		
Unit 15 - The rabbet joint			
A. How to lay out and cut	87	53	182
B. Where rabbet joints are used			88
Unit 16 - The router			
A. Shaping and Veining	141	192	298
B. Inlaying	141	193	
Unit 17 - Making a drawer			
A. Cutting joints			111
B. Assembling and fitting			115

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
Unit 18 - Assembling projects			
A. Gluing and clamping			130
B. Squaring up after clamping			131
Unit 19 - Crack fillers			
A. Plastic wood			139
B. Stick shellac			139
Unit 20 - Finish sanding			
A. Final sanding with finishing paper			139
B. Sponging and resanding Using a wash coat of shellac			148 142
Unit 21 - Wood filler			
A. Paste filler			148
B. Staining filler			148
Unit 22 - Staining			
A. Use of different kinds of stain			177
B. Bleaching			146
Unit 23 - Finishing			
A. Selecting the finish			15
B. Applying the finish rubbing the finish			146-153 143

Part B

Unit 1 - Explanation of course			
A. Requirements			
B. Assigning work stations			
Unit 2 - Selecting a project			
A. Intended use of project			11

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
B. Kind of wood to use			12
C. Designing a project			26
Unit 3 - Reading a working drawing			
A. Drawing and dimensioning			44
B. Planning procedure of work			49
Unit 4 - The circular saw			
A. Cutting to length	82	56	174
B. Cutting to width	84	43	170
C. Bevel cutting	89	48	180
mitering	86	62	183-188
Tapering with a jig		51	181
Unit 5 - The jointer			
A. Facing	112	130	245
B. Jointing end grain		132	248
C. Rabbeting	118	134	253
chamfers and bevels	114	105	249
tapering	116	133	251
Unit 6 - Using the grinder			
A. Grinding tools and drills	31-76		355
B. Gumming circular saws		338	
Unit 7 - Making table legs			
A. Gluing face to face			74
B. Tapering		133	251
C. Cutting compound angles	87	360	188
Unit 8 - The drill press			
A. Drilling for screws			277
B. Drilling for dowels			268

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
C. Mortising on the drill press using a plug cutter	131	229	289 278
Unit 9 - The bandsaw			
A. Cutting curves	105	90	220
B. Sawing after a pattern		99	
C. Bevel cutting	104		216
resawing	105	100	215
Sawing cabriole legs		93	
Unit 10 - The jig saw			
A. Sawing inside and outside curves	110	111	237
B. Use of saber saw		114	234
C. Sanding on the jig saw		114	
Unit 11 - The lathe			
A. Cylinders and faceplate turning	25-44		342-352
B. Sanding and finishing turned work			350
Unit 12 - The router			
A. Cutting decorative edges and inlaying	141	146	298
B. Cutting dovetail joints		196	301
C. Cutting rabbet joints			299
Unit 13 - The shaper			
A. Shaping edges and ends	135		
B. Shaping against a straight guide	133	170	285
C. Cutting moldings and shaping large stock against a collar	136	135	
Unit 14 - Maintenance of the circular saw			
A. Fitting circular saws	98	338	
B. Allignment and adjustment of belts			

Outline of Instructional Units	1 Smith	2 Hjorth	3 Feirer
Unit 15 - Maintenance of the bandsaw			
A. Replacing and adjusting blades		87	206
B. Adjusting guides		87	209
C. Lubrication			
Unit 16 - Maintenance of the grinder			
A. Adjusting tool rest			
B. Dressing grindstones	78...355		
Unit 17 - Maintenance of the jointer			
A. Replacing knives and adjusting tables	121.....241		
B. Honing jointer knives lubrication			
Unit 18 - Maintenance of the jig saw			
A. Replacing and adjusting blade		106	
B. Lubrication			
Unit 19 - Maintenance of the lathe			
A. Sharpening chisels and gouges			357
B. Lubrication			
Unit 20 - Maintenance of the shaper			
A. Honing cutters			356
B. Lubrication			
Unit 21 - Maintenance of spray equipment			
A. Lubricating and replacing gaskets			

The courses outlined in this chapter have been prepared in brief form. It might be well to point out that safety practices are not included in the outline, but will be discussed during demonstrations and stressed throughout the

courses.

Projects made in the courses are selected by the students to meet their personal needs, but must be approved by the teacher. Students who are enrolled in both industrial arts and agriculture may be given credit for projects completed in the agriculture shop, as facilities for welding are not available in industrial arts.

Part C

Organization and Management of Classes

Work stations and clean up areas are designated by the teacher, and assigned to the students for a period of one week, before rotating them to a different area.

Students are expected to do their best work at all times, specific standards of construction and workmanship should be maintained. The courses are intended to be flexible, in order that faster students may work to their full capacity, and explore various other fields they may choose when it is practical and facilities are available.

Time Available. Classes are to meet for a period of one hour a day, five days a week for two semesters or a total of 180 hours. Approximately one fifth of the time will be used for demonstrations and other forms of instruction. Students that are absent may make arrangements with the teacher to make up time outside of regularly scheduled class periods.

Equipment Available. A complete list of equipment is presented in the form of an inventory. Supplies of a general nature are kept in the supply room and issued by the teacher. Each class has a group of lockers covered by double doors that may be locked when the class is not in session.

Financial Policies. Students are required to pay an enrollment fee of two dollars for mechanical drawing and three dollars for woodwork. Students enrolled in woodwork pay an additional deposit to be used for purchasing lumber and supplies, any money not used is refunded at the close of the school year. The cost of any material used in excess of the initial deposit must be paid. The school secretary handles all financial matters pertaining to the school. The teacher may obtain the current balance in the shop fund from the secretary when it is necessary to have this information.

All employees making school purchases must first secure the approval of the superintendent of schools on all purchase requisitions.

Shop Controls Under the Direction of the Teacher. The teacher issues all supplies and materials and keeps an accurate record of student projects. He controls the closing and dismissal time of classes. All accidents must be reported to the teacher and he is to determine how and when first aid will be administered.

Shop Controls Delegated to the Students. Shop duties

will be assigned to the students and are to be alternated by the instructor. These duties will consist of checking tools, cleaning benches, machines, sweeping, and cleaning the finish room. Any unsafe working conditions found should be reported to the teacher. Each student is responsible for cleaning his own work station and returning tools and materials which he has used to their proper place. Definite instructions are given, and emphasis placed on efficient performance of duties.

Grading. The factors determining the students final grade in woodworking are, quality of work, quantity of work, scores on tests, work habits, attitude, and attendance. The parents are notified if students work is unsatisfactory, or attendance is irregular.

Teaching Methods. The methods of teaching will be a combination of demonstrations, lectures, discussions, individual instructions, and visual aids. However, the demonstration method will be used extensively.

Reference Material. A number of reference books are available in the shop library that pertain to various fields other than woodwork. There are also books of project plans, the latest editions of Industrial Arts and Vocational Education, and School Shop magazines.

Students desiring to do extra work in the industrial arts department may do so, during periods they do not have

other classes scheduled. Credit will be given to students in their final grade for doing additional work. However, students doing additional work should not expect to make above average grades, if their ability and workmanship does not warrant such a grade.

The question of borrowing tools is encountered frequently. Although the tools may be considered public property they should remain within the building. The approval of the superintendent is required if a situation should arise, where it is necessary to borrow tools.

A summary of this report will be given along with recommendations for further study and improvement of the industrial arts department in Newkirk in the following chapter.

CHAPTER IV

SUMMARY AND RECOMMENDATIONS

In this report 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 present system of education. Two drawings are presented that show the physical facilities of the industrial arts department in Newkirk, and courses of study have been constructed for drawing and woodwork.

Summary. Since a limited amount of material has been written about primitive man, little can be said about his contributions to education. The first important development of the history of industrial arts may 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 monastaries by the Benedictine Monks. Outside the monastaries, apprenticeships were the principal form of education. The youths were taught a trade during a 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 immigrants contributed many ideas to the educational systems in this country. The intermingling of old and new ideas seemed to strengthen and improve these systems of education.

A building was constructed in 1920 in Newkirk for the purpose of offering manual training. The program was carried on under the name of manual training until 1936 when it was changed to industrial arts. The department remained in the same building until 1952 when it was moved to the basement of the old high school building. In 1956 it was moved to the present location in the new addition to the high school.

Two drawings are shown, one of the physical facilities and the other showing the layout of equipment in the industrial arts shop and drawing room. An inventory of equipment is listed, and courses presented for mechanical drawing and woodwork. Class organization and management is discussed and the financial policies of the school, methods of teaching, grading, and reference material available to the students is explained.

Recommendations. The writer recommends 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 throughout the courses. For safety reasons it is recommended that a more efficient exhaust system be installed in the finishing room, as the present facilities are inadequate for the proper discharge of lacquer fumes and is definitely a fire hazard.

Teachers should realize they need to do a better job of advertising 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 educational program.

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