

Date: January 21, 1961

Name: Lehr, Robert J.

Position: Student

Institution: Oklahoma State Univ.

Location: Stillwater, Okla.

Title of Study: VISUAL AIDS CORRELATED WITH THE COURSE OF STUDY
FOR WOODWORK IN THE JUNIOR HIGH SCHOOLS, WICHITA,
KANSAS

Number of Pages in Study: 70

Under Direction of What Department: Industrial Arts Education

Scope of Study: This study was developed to encourage the industrial arts teacher to make more use of visual aids as a means of improving his instruction. The history and philosophy of visual aids indicates their importance as a teaching medium and tells how they have been used from the time of the primitive man. Demonstration sheets, film synopsis of films in the Wichita Film Library, and material obtainable from commercial firms were developed to correlate with the course of study for woodwork in Wichita, Kansas.

Conclusions: Visual aids have always had a place in the learning process and are probably the oldest means of conveying ideas. However, the most rapid growth has taken place in the past two decades. World War II had a tremendous effect upon visual aids as a teaching medium as thousands of men were trained, in a brief period of time, by this method.

The industrial arts teacher can enrich his teaching and provide a more effective means of presenting his instruction by making use of the various types of visual aids. The shop can be made a more interesting place to work, and help create the desired attitude in the mind of the student, with colorful displays and models.

ADVISER'S APPROVAL

C. L. Hill

VISUAL AIDS CORRELATED WITH THE COURSE OF STUDY
FOR WOODWORK IN THE JUNIOR HIGH SCHOOLS, WICHITA, KANSAS

AUG 23 1961

VISUAL AIDS CORRELATED WITH THE COURSE OF STUDY
FOR WOODWORK IN THE JUNIOR HIGH SCHOOLS, WICHITA, KANSAS

A Report

by

ROBERT J. LEHR

Bachelor of Science

Pittsburg State Teachers College

Pittsburg, Kansas

1948

Submitted to the Faculty of the Graduate School of

Oklahoma State University

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

1961

470405

VISUAL AIDS CORRELATED WITH THE COURSE OF STUDY
FOR WOODWORK IN THE JUNIOR HIGH SCHOOLS, WICHITA, KANSAS

ROBERT J. LEHR

MASTER OF SCIENCE

1961

REPORT APPROVED:

C. R. Hill

Report Advisor and Head,
Department of Industrial Arts Education

L. H. Bengtson

Associate Professor,
Department of Industrial Arts Education

Dean of the Graduate School

ACKNOWLEDGMENTS

The writer, with sincere appreciation, wishes to gratefully acknowledge his indebtedness to Mr. Cary L. Hill, Head of the Industrial Arts Education Department, Oklahoma State University, for his guidance and counseling throughout the writing of this report.

R.J.L.

TABLE OF CONTENTS

CHAPTER	PAGE
I. THE PHASES OF THE STUDY	1
Origin of the Study	1
Needs for the Study	2
Definition of Terms	3
Industrial Arts	3
Teaching Aids	3
Visual Instruction	3
Visual Aids	3
The Demonstration	3
Review of Previous Studies	4
The Ledbetter Study	4
The Olive Study	5
The McNutt Study	5
II. HISTORICAL STUDY OF VISUAL AIDS	7
Early History	7
Middle Ages	8
The Renaissance Period	9
The Seventeenth and Eighteenth Century	10
Modern Development	12
III. PHILOSOPHY	15
Philosophy of Learning	15
Philosophy of Visual Education	16
IV. THE APPLICATION OF VISUAL AIDS TO THE COURSE OF STUDY	19
The Demonstration	20
Lumbering	21
Planes	25
Squaring Stock	29
Layout Tools	31
Hand Saws	34
Wood Chisels	37
Wood Bits	39
Screws	41
Nails	43
Scraping Tools	46
Abrasives	48
Glue and Gluing	49
Wood Joints	51
Wood Finishing	54

CHAPTER	PAGE
Circle Saw	56
Band Saw	58
Jointer	59
Surfacer	61
Jig Saw	63
Lathe	64
Drill Press	66
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	67
Summary	67
Conclusions	69
Recommendations	69
A SELECTED BIBLIOGRAPHY	70

CHAPTER I

THE PHASES OF THE STUDY

The use of visual aids as an effective method of teaching has made rapid progress in the past two decades. During World War II military training became a huge proving ground for visual aids, as they were used by the armed forces to accelerate the training program and prepare the personnel for duty in the shortest possible time. Since then the use of visual aids in the educational field has progressed until many of the larger school systems throughout the country have their own film libraries.

The term "visual aids" is often construed to mean the showing of film or slides. In the industrial arts field there are many types of visual aids such as; models, cutaways, samples, drawings, and demonstrations which all play an important part in clarifying and vitalizing the instruction. This report will present some of the methods in which the various visual aids may be used in conjunction with the adopted course of study.

Origin of the Study. Upon the completion of a course in visual aids, the writer recognized the value of visual enrichment as an effective method of presenting knowledge through the seeing experience, and realized he was not

taking full advantage of this valuable tool to improve his instruction. Visual aids are a vital part of the curriculum and every industrial arts instructor should know how to make use of this appealing teaching aid.

Mr. Moriconi, Mr. Wilson, Mr. Ashley, and the writer, all teachers in the junior high school at Wichita, Kansas, have spent considerable time working together on the development of aids for the industrial arts shops. In the process, many pertinent problems were discussed, and it was agreed there is a dire need for a teaching guide for the junior high school industrial arts teacher in the Wichita system. It was decided to approach this problem as a study. The writer selected visual aids as his part of the project, this study is the result.

Needs for the Study. Due to the increasing amount of clerical work, reports, and other time consuming duties imposed on the average industrial arts teacher, there is a tendency to neglect the developing of teaching aids and making the most use of the available visual aids.

Visual instruction is a basic tool for the industrial arts teacher and he should develop the various types of visual aids to enrich his teaching and provide the most effective means of presenting his instruction.

It is the writer's intention to develop and present a group of visual aids to correlate with each unit in the course of study for the junior high school in Wichita, Kansas.

Definition of Terms. The following definitions have been selected to give the reader a better understanding of the terms used by the writer in this report. In clarifying the meaning of these terms, extracted from various references, it was noted there is a close similarity of the definitions given to the terms pertaining to the seeing experiences.

Industrial Arts, "those phases of general education which deal with industry--its organization, materials, occupation, processes, and products--and with problems resulting from the industrial and technological nature of society." (7, page 2)

Teaching Aids, "are things or objects brought into play to emphasize, clarify, or vitalize the instruction." (3, page 148)

Visual Instruction, "means the presentation of knowledge to be gained through seeing experience." (2, page 6)

Visual Aids, "any type of visual stimulus used to supplement instruction by the spoken or printed word." (7, page 125)

The Demonstration, "is a visual technique of first importance. It ranks with the industrial trip in the matter of realism, since real materials, real tools, and actual operations are presented for student instruction." (7, page 130)

Review of Previous Studies. A review of similar studies pertaining to the use of visual aids, in the teaching of industrial arts, was necessary in preparing this study. In reviewing the previous studies, the writer was interested in finding the purpose for which the studies were made, the extent to which the studies covered the use of visual aids, and to gain additional information from the selected studies.

The Ledbetter Study. James Luther Ledbetter completed his master's thesis in 1941 entitled Visual Aids Furnished by Commercial Firms for Use in Industrial Arts Classes. The author approached his study by giving the philosophy and objectives of general education and industrial arts.

To obtain maximum results from teaching aids the instructor should know what teaching aids are available, how they can be obtained, and their general content. The writer, in his attempt to secure this information, sent a letter to one hundred and ten firms requesting teaching aids they might have available. More than two hundred replies were received due to the fact that many companies forwarded to other companies several copies of the original request.

The industrial arts field was divided into separate subjects, and the material received from the various firms was listed under the subject to which it pertained. The material was given a rating, in accordance with a rating chart the author had constructed for this purpose, and fully annotated.

In his conclusion the author advised the advertising items often show only one side of a question and the facts substantiate the argument favorable to the advertiser. However, the study indicated the commercial visual aids are a valuable tool and should be used more by the industrial arts teacher.

The Olive Study. William Thurmond Olive completed his master's report in 1950 entitled The use of Projected Pictures for Industrial Arts Teaching. In this study the writer outlined the objectives in evaluating a motion picture; the objectives of a good film; a method for evaluating a film; and an example of a rating scale to be used in evaluating the film. Another phase of the study presented the sizes, advantages, and the cost factors of the film strip, motion pictures, and lantern slides.

The writer concluded his report by listing the names of nine Oklahoma colleges furnishing educational films, and all the pertinent information required for teachers to order film from the various schools. A list of educational films for industrial arts classes was arranged by subjects, including a complete description of the film and where the film could be obtained.

The McNutt Study. John William McNutt completed his master's report in 1956 entitled Audio-Visual Aids in Industrial Arts. The writer presents the functions performed by visual education and included an explanatory paragraph on

each item. The historical development and philosophy of visual aids was given indicating that the idea of visual education is not new, and that man has been learning visually since his first day on earth.

The study expressed the value and importance of using audio-visual aids in industrial arts, listing the main types of usable visual aids and how each could be used in presenting instructional material to the students.

McNutt advised the use of visual aids does not decrease the necessity of careful planning. It is important for the teacher to be familiar with the visual aids which he proposes to use, and considerable planning in advance is required if the teaching aids are to be effective.

The foregoing chapter has presented the problem, needs for the study, and a review of some of the previous studies pertaining to visual aids. The following chapter will discuss the historical development of visual aids.

CHAPTER II

HISTORICAL STUDY OF VISUAL AIDS

Visual aids is probably the oldest method of conveying ideas. Primitive man conveyed his thoughts by signs, gestures, expressions, and crude imitations long before he developed a vocabulary with which to express them orally. Primitive youth were doubtless taught through observation and imitation. Later came picture writing and varied forms of early alphabets. However, the farther away the expressions got from the early simple forms, the more difficult they became to understand.

Early History. Man living in the primitive ages was mainly concerned with the task of providing food and shelter for his family. The young boys were taught to hunt, fish, and make articles necessary for survival through imitation, observation, and demonstration. Field trips were also used as a method of teaching the children something of the surrounding area and the ways of life.

It is known that shadow pictures and puppets have been used by the Orientals for thousands of years in providing religious and tribal instruction. There is a record of how, about 1000 B. C., Emperor Muh of China staged several puppet shows for his friends.

Pictographs were man's earliest record of recorded visual education. The Egyptians developed the use of clay baked picture inscriptions leading to the hieroglyphic writings, and utilization of the flat three dimensional images. (4, page 23)

The Greeks developed intellectual instruction in which objective materials were used to teach history and civic ideals. The drama was used as visual instruction in teaching moral and political attitudes; music to induce various moods; paintings and sculpture commemorated historical and religious events. Emphasis was also placed upon the field trip in the educational system of Greece and Rome.

Art as a teaching value was also known to the Romans. Through sculpture they taught the populace about war victories. Visual aids were used in the schools and justified by the intellectual leaders of the day. Cicero (106 B.C.-43 B.C.) approved of visual forms as devices for remembering abstractions; Seneca (approximately 4 B.C.-65 A.D.) favored visual teaching on the ground that men believed visual perceptions above all others; Quintilian (approximately 35 A.D.-100 A.D.) recognized that interest helps the child to absorb knowledge, conceived of teaching the alphabet by games played with letters carved out of wood or ivory blocks. (4, page 23)

Middle Ages. In the middle ages (400-1400) learning was divided into the "low brow" practical types forced on the laboring classes, and the "high brow" bookish type where

the glory of past culture was preserved in manuscript form. During this period there was little demand for objective materials except in the church, which endeavored to teach its religious truths through statues, carvings, stained glass windows, and sensory symbols such as candles, incense, bells, vestments, relics, and the rosary. Out of the church came such instructive spectacles as pageants, and the miracle and morality plays, often done with marionettes.

The Renaissance Period. During the renaissance (14th-16th centuries) puppets came to supplement marionettes in popular instruction and entertainment. The art of the great masters of painting and sculpture was educational and looked to the church for its subjects. Vittorina da Feltre, an outstanding Italian educator, covered the walls of his school with frescoes of children playing. He followed Quintilian in teaching the alphabet by means of tangible letters, and used colored pictures to interest his students in their lessons.

Centuries before printing was invented, manuscripts were decorated with artistic designs. Originally, few of these decorations were planned to assist the reader in understanding the text, but by the time printing appeared there was a decided trend in this direction. The first illustrated schoolbooks appeared about 1460 shortly after the invention of moveable metal type. Early illustrations were taken from old manuscripts until approximately 1500 when artists began drawing from nature for the woodcuts. Some of

the early textbooks were Der Edelstein, 1416, a collection of fables with 101 woodcuts; Ptolemy's Cosmographis, 1478, with maps; and Braydenback's Pilgrimage, 1478, of famous travel book containing many pictures.

The Seventeenth and Eighteenth Century. The Seventeenth Century witnessed an exceedingly widespread use of the visual aids. During this period John Amos Comenius advocated teaching according to the order of nature and arts. He conceived "the child perceives through the senses, everything in the intellect must come through the senses." (1, page 36) Comenius's famous "Orbis Pictus," published in 1658, is one of the best known early well-illustrated textbooks. In 1690 our own celebrated "New England Primer" appeared, an illustrated schoolbook which was used for more than a hundred years.

Pierce Nicole, the distinguished French Jansenist, proposed the theory that children should be taught through their senses and instruction in a new subject should always be given by means of an appeal to their sight and hearing. He used maps, pictures, and flash cards for a number of years in his school for boys in Port Royal.

Jean Jacques Rousseau published the "Emile" in 1762. It started a revolution in educational theory and practice, the effects of which are still felt today. He opposed the theory that the knowledge of the things of the world could be secured through a study of words and books. Rousseau made sense perception fundamental in elementary education

by advocating a varied experience with natural objects through first-hand contact and manipulation. He also advocated making the education of the child between the ages of five and twelve entirely education through experience and the senses.

The following quotation expresses Rousseau's views:

As all that enters the human understanding comes through the senses, the first reason of man is a sensuous reason; and it is this which serves as a basis for the intellectual reason. Our first teachers of philosophy are our feet, our hands and our eyes. To substitute books for all these is not to teach us to reason, but to teach us to use the reason of others; it is to teach us to believe much and never to know anything. (6, page 194)

He expected the child to cultivate a genuine curiosity for an interest in the world about him, and thus expected the child to think for himself rather than accept the thinking of others.

Pestalozzi's experimental schools in Switzerland were for twenty five years the Mecca of European and American educational leaders. He was greatly influenced by Rousseau and wrote vigorously against teaching words and phrases that children did not understand. To quote him:

Everything confirms me in my opinion that the only way of escaping a civil, moral, and religious degradation, is to have done with the superficiality, narrowness and other errors of our popular instruction, and recognize sense impression as the real foundation of our knowledge. (4, page 30)

Abbe Lenglet, a historical and geographical methodologist and critical editor, claimed children learn more readily when they employ their ears, their eyes and their hands. Two lasting results in the art of teaching stemmed

directly from his ideals. First: the use of memory work for memory's sake was severely weakened; second: comprehension by means of visual contact became increasingly important as a teaching method.

Abbe Lenglet died in 1775 and it may be said that his ideals represented the philosophical peak of visual education in the Eighteenth Century.

Modern Developments. The works of Comenius, Rousseau and Pestalozzi flowed into the educational institutions during the nineteenth century. However, the use of objective materials in education did not become an organized and widespread movement until the twentieth century.

The first school museum was established at St. Louis, Missouri, in 1905. School museums were organized at Reading, Pennsylvania in 1908 and at Cleveland, Ohio, in 1909. These three museums were the first museums organized for the sole purpose of providing material for instruction in the public schools.

When a teacher ordered a collection, provisions were set up for transportation of the materials from the museum to the schools and back. Each collection contained models, objects, specimens, pictures and printed pamphlets. Exhibits of the non-portable type could be viewed by the children at the museum.

About 1895, principals of the Chicago Public Schools organized a projection club and purchased lantern slides

for their schools from funds contributed by the members. The club grew to such an extent the school board assumed the responsibility for visual education in 1917 and placed it in the hands of a visual education department. Following the establishment of the Chicago bureau many departments were organized between 1917 and 1923. More than three-fourths of the cities with a population over 100,000 have special agencies to supervise audio-visual instruction. Over one-third of the cities from 30,000 to 100,000 also have special audio-visual centers.

With the sudden growth of mass education, it became difficult to take large numbers of children to nature for first-hand experiencing, but nature could be brought into the classroom through the medium of sound motion pictures, slides, stereographs, and the forms of objective representation.

Modern Science and invention have opened unlimited possibilities in the organization of concrete material for the improvement of instruction. The invention of the photograph and photoengraving have given us illustrated school textbooks. The microscope and the telescope reveal the existence of worlds that were formally unknown to us. The motion picture has become one of the school's most valuable teaching devices because of the vast variety of stimulating information it can bring into the classroom. This is only a very small sample of the modern means the present day teacher has at his disposal.

The development of television, for use in the schools, is still in the experimental stage. Some of the larger school systems have been allocated a channel to be used exclusively for educational purposes. Through this media students will be able to see world events take place. It will have a tremendous effect on education, science, and culture.

The preceding chapter has developed a brief history of visual instruction, showing how man used this method of teaching from the primitive man to the modern classroom with its television set. The chapter to follow will deal with the philosophy of visual aids as a means for more effective teaching.

CHAPTER III

PHILOSOPHY

Through the years man's progress has depended upon the background of his experiences. Each generation passes on to the next its experience so that the new generation may continue to move forward. Therefore, the early years of youth are devoted largely to acquiring new realistic impressions, making it possible for him to grow in knowledge and take his place in society. Visual aids are one of the most effective instruments for bringing concrete experiences into the learning process.

Philosophy of Learning. Communications is the sharing of an experience. A small boy has learned the meanings of over two thousand words before he starts school because he has used them as a means of doing hundreds of different things. For example, his dog at home runs and barks but becomes a pallid symbol, a series of little marks on a piece of paper, when he enters school.

Some people become very skillful in handling these verbal symbols, but the problem of meaningless symbols is as old as language itself. It became worse as the written language developed because we had to learn several words for the same idea. When symbols are memorized, and not understood,

they are easily forgotten because the student does not associate the word with anything concrete and often does not know what he is talking about. Sidney Pressey in *Psychology and the New Education* says:

Other things being equal, material will be remembered in proportion as it is meaningful, and it is the meaningful element in any given unit of subject matter which is best remembered. Learning will last in proportion as it is made significant to the learner. (5, page 2)

We forget when the new learning does not seem important to us. We also forget when we do not see clearly what we are suppose to be learning or do not make use of what we have been asked to learn. Educators believe that visual aids can help decrease the amount of forgetting and increase the permanence of what is taught.

Philosophy of Visual Education. Instruction with visual aids provides the concrete experiences which are essential to enriched learning. It has been demonstrated that a student's verbal expressions are not always an indication of a real thorough understanding. Visual aids give meaning to words and symbols; they clarify ideas involving higher abstractions and may be used to prevent the temptation of over verbalizing the instruction.

The first step in good instruction is the successful inter-communication of ideas between the teacher and pupil. Language concepts are seldom adequate for giving complicated directions. For example, there would be more accuracy of communication between the teacher and student if a chart

were used to explain how to thread a motion picture projector rather than try to explain the operation by language alone. Interest increases when the discussion is centered on an object, picture, or model.

Visual aids cut across language barriers. They are a universal language understood by almost everyone. One of the most valuable devices is the demonstration of the pattern to be learned. A frequently used expression, "I have told him time after time how to do it but he still does not learn." Students progress much faster in developing the desired behavior patterns by imitating the behavior of those who are skilled rather than being told how to do it.

Instruction with visual aids can contribute much to the development of proper attitudes. During World War II they were used to develop attitudes, create morale, and motivate behavior by using strong emotional presentations. Visual aids are the only effective way of developing attitudes in those that follow the theory we believe what we see.

A major principle of learning is that learning is conditioned by past experiences and one's present frame of mind. Effective teaching can best be accomplished when the new is linked with the old. New experiences can be had through visual material which will serve as a background for the development of lessons in areas where students have had little experience. In using visual material to furnish the background for new learning, it is important that the

objects be shown in the proper size relationship to other objects to avoid erroneous impressions.

Visual aids are very effective in arousing interest in the student. However, the student can become over stimulated and the lesson turned into a form of entertainment if he is exposed to a variety of new expressions at one time. The attention of the student should be concentrated upon a small unit of work which the student can master and avoid the confused feeling which might otherwise occur.

Physical objects do not educate. It is what they mean that can change our responses to them. Direct contact with semiconcrete experiences such as motion pictures, photographs, or color slides do not insure educational experiences. Experiences do not remain with us very long unless they are tied to a purpose. There must be pre-planning so the students will have a clearcut purpose in mind for the activities to be undertaken. The student must also be taught how to observe, and how to study objective materials.

Having presented a condensed philosophy of visual instruction, the next chapter will include a series of demonstration units and indicate some of the visual aids pertinent to that unit.

CHAPTER IV

THE APPLICATION OF VISUAL AIDS TO THE COURSE OF STUDY

Visual aids are not designed to replace or revolutionize but rather to supplement and enrich the other methods of teaching. They should be correlated with the established units of work which will require careful planning by the instructor. Visual aids contribute to clearness of perception and accuracy in learning by substituting clear concepts for vague ones. They are fundamental to verbal instruction by reducing verbalism or the meaningless use of words or phrases. The old Chinese proverb that a single picture is worth a thousand words emphasizes the importance of visual aids to effective teaching.

It is possible to transform a bare, unattractive room into a stimulating environment by the use of color and such visual aids as pictures, charts, and displays, which tend to produce an atmosphere of work, study, and experimentation. There is a wealth of this type of material which the industrial arts instructor may obtain from various commercial firms.

This chapter will be devoted to developing demonstration units that are correlated with the units of the course of study for the junior high school in Wichita, Kansas. It will

also list some of the teaching aids which may be constructed or obtained to supplement the instruction.

THE DEMONSTRATION. The teacher demonstration is one of the most effective ways of using visual aids. Studies have shown where the teacher has the materials, tools, and knowledge and skill required, the demonstration is more effective than verbal instruction with slides and films. It helps to clear up what might otherwise be vague and even meaningless to the students who are not strong in mental or abstract visualization and have a language handicap. Seeing that the thing can be accomplished eliminates doubts and strengthens the determination to duplicate the procedure.

In preparing for the demonstration have all the material, tools, and equipment at hand before the demonstration starts. If necessary practice the operation before-hand and use the same material and equipment used by the students. This eliminates the doubts of the students as whether or not the operation can be accomplished with the tools at their disposal.

An important aspect of putting the demonstration over is to make clear why, how, and when. The student should know why the operations are performed, how they are performed, and when they are to be used. After the pupil has acquired this information give him the opportunity to put it in operation as soon as possible. The instructor should supervise the students work to make certain the proper procedures are followed.

LUMBERING

TEACHING AIDS:

A. SUGGESTED TEACHER CONSTRUCTED AIDS:

The cross section of a walnut log, or similar wood, is excellent for showing the sapwood and heartwood as well as the other parts of the tree.

From scrap lumber cut 3' X 5" pieces of all the different species of wood used in the shop. Sand and finish the wood with a clear sealer to prevent the wood from changing colors. These may be displayed on a panel with name plates below each specimen or eye hooks attached to one end and hung from the hooks above the blackboard. If the latter method is used the name of the wood should be applied to one face.

B. FILM:

Redwood Saga. Ten minute black and white Wichita Board of Education film number 946.

It begins with the building of the railroad to carry the logs out of the forest; a lumberjack is shown topping the spar tree so the cable can be attached; a tree is cut down by axe and hand sawing; caterpillars pull the logs out of the forest where they are picked up by the cable; logs are loaded on a railroad car and transported to the mill pond where they are dumped. The final scenes show the log being taken from the mill pond into the mill and a brief view of the band saw and the stacking of the lumber to dry.

Lumbering. Thirteen minute black and white Wichita Board of Education film number 935A.

The film is one of the older films, probably produced in the thirties, but still has some value. It shows a map indicating the lumber areas of the world; cutting trees down with axes and handsaws; dragging trees out of the forest by a steel cable; lumberjack being hoisted to the top of the spar tree; hauling logs to the mill on a railroad; dumping the logs in the mill pond; floating logs down the river; taking logs from the mill pond into the mill; a very brief view of the band saw, trimming saws, and stacking the lumber to season.

Lumber for Houses. Thirteen minute black and white Wichita Board of Education film number 912A.

A up to date film showing the cutting down of a tree with chain saws; cutting the fallen tree to length by a buckler; hauling the trees out of the forest by caterpillar; loading the logs on trucks; dumping the logs into the mill pond; washing the surface of the log with water under high pressure. In the mill the film shows the cutting of the log by band saws; edging the boards; trimming the boards; gang saws cutting large timbers into several boards; and the final step of running the boards through the planing mill.

Knowing Woods and Their Uses. Thirteen minute black and white Wichita Board of Education film number 980A. The film indicates the forest region of the United States on a map; explains the parts of a tree; plain and quarter sawn lumber; veneer construction; how woods are classified; length and width of softwood and hardwood; rough and dressed lumber; grades of lumber; finish dimensions; board feet; linear feet; square feet. It also mentions the characteristics of Redwood, Walnut, White Pine, and Birch.

Green Harvest. Thirty minute color Wichita Board of Education film number 718C.

The film begins with a young couple getting married and visiting her Uncle's cabin in the forest. The Uncle shows a film which briefly shows a caterpillar pulling logs out of the forest; loading logs on railroad cars; dumping them into the mill pond; hauling of finished lumber. The balance of the film is concerned with conservation, such as: selective cutting, seeding of cut areas, and fighting forest fires.

The Woodworker. Thirteen minute black and white Wichita Board of Education film number 913.

The film starts with the rough carpenter, showing some of his work, such as: making forms, framing houses, and applying roofs. Work of the finish carpenter is included in laying floors, installing doors, and cabinets. It also shows the craftsmen in the mills

manufacturing doors and stairs; furniture and cabinet makers making and using veneer; pattern making and how they are used in the foundry.

C. FILMSTRIP:

Lumber Production. Wichita Board of Education film number FS 905. The film includes 15 frames.

Story of West Coast Lumber. Wichita Board of Education film number 955. The film has 62 frames.

D. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Grand Rapids Wood Finishing Co., Grand Rapids, Mich.
Sample wood panel.

Frank Paxton Lumber Co., Kansas City, Kansas.

Wood sample set.

PLANES

SHARPENING THE PLANE IRON

MATERIAL:

Plane Iron
Tool Grinder
Oil Stone
Kerosene
Rags

PROCEDURE:

1. Discuss the proper bevel of the plane iron, 2 to 2 1/2 times the thickness of the plane iron.
2. Explain how the tool grinder operates and the type of coolant used.
3. Demonstrate the sharpening of the plane iron on the tool grinder.
4. Explain how a wire edge has been formed that will be removed on the oil stone.
5. Place kerosene on the oil stone indicating it is used to carry off the steel particles.
6. Demonstrate the use of the oil stone in removing the wire edge and emphasize the full length of the stone should be used.
7. Run the finger nail over both edges showing the students how to check the plane iron to see if the wire edge has been removed.
8. Explain how the edge may be checked for sharpness.

PLANES
HOW TO USE

MATERIAL:

Jack Plane
Double Plane Iron
Scrap Lumber

PROCEDURE:

1. Demonstrate the proper method of securing the plane iron cap to the plane iron, explaining why the plane iron cap is positioned approximately 1/16 inch from the edge.
2. Demonstrate inserting the double plane iron in the plane and securing it with the lever cap.
3. Demonstrate how the plane is adjusted with the lateral adjustment lever and the adjusting nut.
4. Have the students perform the above operations. (It will pay dividends if the instructor will check each operation of the student before he is allowed to go to the next step).
5. Demonstrate the proper use of the plane emphasizing the need to shift the pressure from the knob to the handle of the plane.
6. Give each student a scrap piece of lumber so they may become familiar with the plane.

TEACHING AIDS:

A. FILM:

Planes. Ten minute black and white Wichita Board of Education film number 903A.

The film begins by showing a picture of the jack plane, smoothing plane, jointer plane, spoke shave, rabbet plane, bullnose plane, and router plane. It explains the various parts of the plane and how to assemble the double plane iron; how to adjust the plane for cutting; checking the stock for warp; the use of the jack plane, including the proper method of shifting the pressure on the plane as the plane moves across the board. There is also a short demonstration of where the various planes, mentioned above, are used and how to cut a bevel and a chamfer with the plane.

B. **FILMSTRIP:**

Planes. A set of nine films, Wichita Board of Education film number FS 947A.

Series A, 24 frames, Bench Planes.

Series B, 15 frames, Plane Adjustments.

Series C, 14 frames, How to Plane A Face or Board Surface Flat and Smooth.

Series D, 11 frames, How to Plane An Edge Straight and Square.

Series E, 11 frames, How to Plane An End Square.

Series F, 8 frames, How to Plane Chamfers and Bevels.

Series G, 14 frames, How to Grind the Plane Iron.

Series H, 15 frames, How to Whet the Plane Iron.

Series I, 14 frames, Some Causes of Poor Planing and How to Correct Them.

C. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Sargent and Company, New Haven, Conn.

Parts chart, Auto-Set Bench Planes.

Stanley Tool Company, New Britain, Conn.

Stanley Wall Charts number C7, C8, C9, C10, C11, C12,
C13, C14, C15, and C16.

SQUARING STOCK

MATERIAL:

Jack Plane
Framing Square
Try Square
Marking Gauge
Pencil
Lumber

PROCEDURE:

1. Demonstrate how to select the working face and how to check the board for wind and warp. Mark the high spots.
2. Demonstrate removing the high spots first and smoothing the balance of the face with light cuts.
3. Demonstrate how to check the working face and plane until the surface is true. (To keep from confusing the students it is probably best to let the students attempt one step before proceeding to the next.)
4. Demonstrate how to plane and check the first edge for squareness to the working face and for levelness.
5. Demonstrate how to plane and check the first end. Include the three methods of preventing the edge from splitting.
6. Demonstrate how to plane and check the second end.
7. Demonstrate marking the board to width, how to plane to the line, and check for squareness.
8. Demonstrate marking the board to thickness with the marking gauge, planing the surface to the line, and checking for squareness.

TEACHING AIDS:

A. FILM:

Measuring and Squaring. Thirteen minute black and white Wichita Board of Education film number 905A. The film begins by showing the bench rule, zigzag rule, steel tape, framing square, and the sliding T bevel. For marking stock the pencil, knife, scratch awl, dividers, trammel points, and the setting and use of the marking gauge were shown. A piece of stock is squared up demonstrating how the various tools are used.

LAYOUT TOOLS

MATERIAL:

Rules
Try Square
Framing Square
Combination Square
Sliding T Bevel
Marking Gauge
Dividers
Trammel Points
Pencil
Pieces of Lumber

PROCEDURE:

1. Demonstrate the correct way of laying off measurements with the various rules in the shop. Indicate how a more accurate reading is obtained by holding a rule on edge. Include the proper method of dividing a board into several equal parts.
2. Demonstrate how the try square is used to check for squareness and to lay out lines square to an edge.
3. Demonstrate how the framing square is used to check larger boards for squareness and lay out lines square to an edge.
4. Demonstrate how the combination square can be used to lay out 45 degree angles.
5. Demonstrate the laying out of various angles with the sliding T bevel.
6. Demonstrate the setting of the marking gauge, showing how it is always checked with a rule, and lay out several lines on a piece of lumber.

7. Demonstrate the setting of the dividers and how they are used to lay out equal distances and draw circles and arcs.
8. Demonstrate the setting and use of the trammel points for drawing large circles and arcs.

TEACHING AIDS:

A. FILM:

Measuring and Squaring. Thirteen minute black and white Wichita Board of Education film number 905A. The film begins by showing the bench rule, zigzag rule, steel tape, framing square, and the sliding T bevel. For marking stock the pencil, knife, scratch awl, dividers, trammel points, and the setting and use of the marking gauge were shown. A piece of stock is squared up demonstrating how the various tools are used.

B. FILMSTRIP:

Measuring, Testing and Marking Tools. A set of eight films, Wichita Board of Education film number FS 945A. Each film shows how to use the tool indicated in the title.

Series A, 13 frames, Foot and Inch Graduations.

Series B, 10 frames, Bench Folding Rule.

Series C, 17 frames, Zigzag and Zigzag Extension Rules.

Series D, 9 frames, Pull Push and Caliper Rules.

Series E, 25 frames, Try Square, Combination Square, and Steel Square.

Series F, 13 frames, Sliding T Bevel and Angle Divider.

Series G, 18 frames, Marking and Mortise Gauge, Trammel Points and Dividers.

Series H, 9 frames, Pencil, Knives, and Scratch Awl.

C. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Sargent and Company, New Haven, Conn.

Chart, The Principle Uses of a Framing Square.

Stanley Tool Company, New Britain, Conn.

Stanley Wall Charts number C1, C2, C3, C7, C8.

L.S. Starrett Company, Athol, Mass.

Chart, Uses for Starrett Combination Square.

Chart, Uses for Starrett Trammels.

HAND SAWS

MATERIAL:

Hand Saws
Scrap Lumber
Holding Devices

PROCEDURE:

1. Explain the various ways of supporting the lumber while it is being cut.
2. Demonstrate the proper position of the body.
3. Show how the left thumb is used as a guide in starting the cut.
4. Demonstrate the use of short strokes in starting the cut.
5. Once the cut is started emphasize using the full length of the blade with even strokes.
6. Explain how the try square may be used to check the blade for squareness.
7. Demonstrate how the stock on the outside of the saw is supported with the left hand to prevent it from splitting.

TEACHING AIDS:

A. SUGGESTED TEACHER CONSTRUCTED AIDS:

Construct a full size blade from $3/8$ " material. Make the teeth approximately 1" long to correct specifications and file to the proper angle. For easy comparison, half of the teeth on the blade should be rip and the other half crosscut. Construct a handle and secure it to the blade with a dado joint. The

saw will be more realistic and attractive if the blade is painted aluminum and the face of the teeth painted red.

B. FILM:

Hand Saws. Ten minute black and white Wichita Board of Education film number 903A.

The film shows the various parts of a saw; explains the set of the teeth and saw kerf; how to mark the board for cutting; when and how to use the crosscut saw both in a vise and with saw horses. It also demonstrates where and how to use the ripsaw, backsaw, miter saw, coping saw, compass saw, and keyhole saw.

C. FILMSTRIP:

Hand Saws For Woodworking. A set of nine films, Wichita Board of Education film number FS 946A.

Series A, 10 frames, Types of Hand Saws.

Series B, 20 frames, Crosscut Saw and Ripsaw.

Series C, 10 frames, How to Use the Crosscut and Ripsaw.

Series D, 12 frames, How to Use Backsaw and Dovetail.

Series E, 10 frames, How to Use Compass and Keyhole.

Series F, 14 frames, Coping Saw and Turning.

Series G, 24 frames, How to Use Miter Box.

Series H, 14 frames, How to Use Picture Frame Miter Machine.

Series I, 27 frames, How to Sharpen Hand Saws.

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 1, 66 frames, Hammers and Saws. The film is divided into three parts, setting up, parts, and using. The film emphasizes safety with several questions over each of the three parts.

D. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Henry Disston and Sons, Inc., Philadelphia 35, Penn.

Chart, How to Use A Disston Hand Saw.

Chart, How A Disston Saw Cuts.

Chart, Disston Special Purpose Saws.

WOOD CHISELS

MATERIAL:

Chisels

Mallet

Lumber (Laid out for a lap joint, convex cut, concave cut, and a gain for a hinge)

PROCEDURE:

1. Demonstrate a horizontal cut with the grain, using both the mallet and the shearing cut made by moving the chisel from side to side. Point out heavy cuts are made with the bevel side down and shallow cuts with the bevel up.
2. Demonstrate a horizontal cut across the grain, indicating the cut is made from both sides leaving the center high which is trimmed last.
3. Demonstrate paring the end grain.
4. Demonstrate cutting a convex curve starting with straight cuts to remove the excess stock.
5. Demonstrate cutting a concave curve emphasizing the cut is made toward the end grain to prevent splitting.
6. Demonstrate the cutting of a gain for a hinge.

TEACHING AIDS:

A. FILM:

Chisels and Gouges. Thirteen minute black and white Wichita Board of Education film number 921A.

The film explains the difference of a socket chisel, tang chisel, and molded handle. It shows the three lengths, standard, butt, and mortising; the correct

bevel; how to sharpen the chisel; how to lay out and cut a gain, dado, mortise, concave curve, and convex curve. It also explains the outside and inside bevel gouge.

B. **FILMSTRIP:**

Chisels for Woodworking. A set of nine films, Wichita Board of Education film number FS 944A.

Series A, 16 frames, Types of Chisels.

Series B, 20 frames, How to Chisel Cuts.

Series C, 18 frames, How a Chisel Cuts Notches, Gains, Rabbets, and Dados.

Series D, 10 frames, How a Chisel Cuts Half Lap Joints.

Series E, 24 frames, How a Chisel Cuts Mortise and Tenon Joints and Dovetail Joints.

Series F, 16 frames, How to Grind Chisels.

Series G, 10 frames, How to Whet Chisels.

Series H, 16 frames, Special Chisels and Gouges.

Series I, 11 frames, How to Grind and Whet Gouges.

WOOD BITS

MATERIAL:

Auger Bit
Forstner Bit
Twist Drill
Countersink Bit
Expansion Bit
Brace
Hand Drill
Electric Drill
Depth Gauge
Dividers
Lumber (Laid out for drilling holes)

PROCEDURE:

1. Demonstrate installing the auger bit in the brace and drilling a hole. In the boring of the hole include the use of the ratchet and the two methods of preventing the wood from splitting out on the back side.
2. Demonstrate the use of the depth gauge.
3. Demonstrate setting the expansion bit and drill a hole.
4. Explain and demonstrate the scribing of a circle with the dividers where it is necessary to drill an accurate hole with the forstner bit. Drill a hole using the bit.
5. Demonstrate the installation of the twist bit in the hand drill and the drilling of a hole.
6. Demonstrate the installation of the twist bit in the electric hand drill and the drilling of a hole.
7. Demonstrate how to countersink one of the holes.

TEACHING AIDS:

A. FILM:

Boring and Drilling Holes. Thirteen minute black and white Wichita Board of Education film number 920A. The film presents a picture of the electric hand drill, automatic drill, hand drill, and the brace; how to install the bit in the brace; parts of the auger bit and their functions; how to use the brace and bit including the ratchet; the sizes of auger bits; use of the depth gauge; use of the expansion bit; use of the forstner bit, screw driver bit, and countersink bit. It explains the twist drill and how to use them in the hand drill and the electric drill; briefly mentions the automatic drill.

B. FILMSTRIP:

Boring Tools For Woodwork. A set of nine films, Wichita Board of Education film number FS 943A. Series A, 23 frames, Types of Boring Tools. Series B, 11 frames, Holding and Boring Tools and Accessories. Series C, 23 frames, How to Bore A Hole. Series D, 15 frames, How to Use the Doweling Jig. Series E, 21 frames, How to Use the Expansion Bit and Forstner Bits. Series F, 15 frames, How to Use the Hand and Breast Drill.

SCREWS

MATERIAL:

Layout Tools
Drills and Countersink Bit
Hand Drill
Brace
Screws
Screw Driver
Wax or Soap
Lumber

PROCEDURE:

1. Demonstrate the layout for installing screws.
2. Explain how to select the correct kind and size of screw.
3. Explain how to select the correct drill for the pilot hole and anchor hole.
4. Demonstrate the drilling of the holes.
5. Demonstrate how to countersink the pilot hole when flat head screws are used.
6. Explain how to select the proper screw driver.
7. Apply soap to the threads and install the screws. Emphasize the correct method of holding the screw driver with the left hand to prevent it from slipping out of the slot and marring the wood.

TEACHING AIDS:

A. FILM:

Using Screws and Nails. Thirteen minute black and white Wichita Board of Education film number 919A.

The film commences with a picture of the common nail, box nail, finish nail, casing nail, brads, and where

they are used. It explains the term penny; how the size of claw hammers are determined and its parts; how to hold the hammer and drive a nail; the use of the nail set; how to pull a nail; how to arrange and drive nails for best holding power; how to clinch and toe nail nails; how to drive nails in hardwoods. It also shows the flat head screw, round head screw, and the oval head screw; gives the parts of the countersink; how to select the proper screw driver and how to use it, including the phillips head screw driver.

B. FILMSTRIP:

Hammers, Screw Drivers, Nails, and Screws. Five films from a set of nine films, Wichita Board of Education film number FS 942A.

Series E, 19 frames, Type of Screw Drivers.

Series F, 12 frames, Preparation for Driving Screws.

Series G, 11 frames, How to Select a Screw Driver.

Series H, 24 frames, How to Use the Screw Driver.

Series I, 8 frames, Wood Screws.

C. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

American Screw Co., Providence, Rhode Island.

American Screw Chart.

Greenlee Tool Co., Rockford, Ill.

Boring Chart for Woodscrews.

NAILS

MATERIAL:

Hammer
Nails
Nail Set
Lumber (Several pieces)

PROCEDURE:

1. Using charts and available nails explain how to select the proper nail for the job.
2. Demonstrate the proper method of holding the nail and hammer. Emphasize holding the hammer near the end of the handle unless small nails are being used.
3. Explain how the hammer handle should be at a right angle to the nail when the blow is struck.
4. Demonstrate the use of light blows to finish driving the nail to prevent marring the wood.
5. Demonstrate and explain the advantage of driving nails at a slight angle.
6. Demonstrate how to drive and set a finish nail.
7. Explain how several nails driven along the edge of a board should be staggered instead of driven in a straight line, which might split the board.
8. Demonstrate the pulling of a nail with the use of one or more blocks of wood. Point out when the handle has nearly reached a vertical position another block should be placed under the head.

TEACHING AIDS:

A. FILM:

Using Screws and Nails. Thirteen minute black and white Wichita Board of Education film number 919A. The film commences with a picture of the common nail, box nail, finish nail, casing nail, brads, and where they are used. It explains the term penny; how the size of claw hammers are determined and its parts; how to hold the hammer and drive a nail; the use of the nail set; how to pull a nail; how to arrange and drive nails for best holding power; how to clinch and toe nail nails; how to drive nails in hardwoods. It also shows the flat head screw, round head screw, and the oval head screw; gives the parts of the screw; how to drill the pilot hole, anchor hole, and countersink; how to select the proper screw driver and how to use it, including the phillips head screw driver.

B. FILMSTRIP:

Hammers, Screw Drivers, Nails, and Screws. Four films from a set of nine films, Wichita Board of Education film number FS 942A.

Series A, 11 frames, Type of Nail Hammers and Nail Sets.

Series B, 16 frames, Information About Hammers and Nail Sets.

Series C, 28 frames, How to Use Hammers and Nail Sets.

Series D, 20 frames, Nails.

C. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

The Colorado Fuel and Iron Corp., Denver, Colorado.

Chart, Colorado Copper Bearing Nails.

SCRAPING TOOLS
SHARPENING THE BLADE

MATERIAL:

Scraper Blade
Mill File
Oil Stone
Kerosene
Rag
Burnisher

PROCEDURE:

1. Demonstrate clamping the scraper blade in a machinist vise near the jaws.
2. Demonstrate how to straighten the edge and remove the burr.
3. Demonstrate sharpening the edge. Hold the file at approximately 35 degrees if a single edge is preferred.
4. Demonstrate how to hone the blade on the oil stone.
5. Demonstrate how to make the scrapping burr with the burnisher. This should be accomplished in two even strokes. The first, with the burnisher held approximately 5 degrees less than the bevel, and the last, with the handle in nearly a horizontal position.

SCRAPING TOOLS

HOW TO USE

MATERIAL:

Hand Scraper
Cabinet Scraper
Wood File
File Card

PROCEDURE:

1. Demonstrate how the hand scraper is held approximately 60 degrees to the surface and may be pulled or pushed.
2. Demonstrate the installation of the blade in the cabinet scraper and how to adjust it.
3. Demonstrate the use of the cabinet scraper indicating it should only be pushed.
4. Demonstrate the use of the wood file indicating pressure is applied only on the forward stroke with a slight shearing cut. Emphasize the file must never be used without a handle.
5. Demonstrate the use of the file card to clean the file.

ABRASIVES

MATERIAL:

Sandpaper
Rubber Sanding Block
Electric Soldering Iron
Small Rag and Water
Lumber

PROCEDURE:

1. Demonstrate attaching the sandpaper to the sanding block.
2. Secure a piece of lumber in the vise and demonstrate how to sand the face. Emphasize going with the grain and the special care necessary on the edges and ends.
3. For edge sanding demonstrate how the block is held with the thumbs on top and the fingers curled under to prevent rounding the edges.
4. Demonstrate sanding a convex surface.
5. Demonstrate sanding a concave surface with the sandpaper wrapped around a large dowel.
6. Demonstrate raising a dent in the wood by use of the soldering iron and a damp rag.
7. Demonstrate the proper method of sponging a surface to raise the grain.

GLUE AND GLUING

MATERIAL:

Hand Screw Clamps
Bar Clamps
C Clamps
Mallet
Small Blocks of Wood
Glue (Paper cup if powdered glue is used)
Rags or Paper Towels
Machined Lumber

PROCEDURE:

1. Demonstrate the use of the C clamps for small jobs and the need for small wooden pads to protect the project.
2. Demonstrate the use of the hand screws emphasizing how the back part of the jaws are brought into contact with the material first and then the outside screw adjusted until the jaws are paralalled.
3. Place the bar clamps in the holding devise provided.
4. In arranging the material for edge to edge gluing emphasize the need for the grain to run in the same direction and how the annual rings are reversed to equalize warping.
5. Explain the need for placing clamps on both sides of the stock to prevent buckling.
6. After the clamps are tightened, demonstrate the necessary checks before the glue is applied.
7. If powdered glue is used demonstrate the proper mixing procedure.
8. Demonstrate the application of glue and tightening

of the clamps.

9. Demonstrate the removal of excess glue with a damp rag or paper towel.

TEACHING AIDS:

A. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Keystone Glue Co., Williamsport, Penn.

Chart, Doing the Gluing.

Casein Co. of America, New York, New York.

The Casco Gluing Chart.

WOOD JOINTS

MATERIAL:

Circle Saw
Dado Head
Drill Press
Brace
Bits
Dowel Jig
Depth Gauge
Try Square
Marking Gauge
Router Plane
Chisel
Pencil
Dowels
File

PROCEDURE:

DOWEL JOINT

1. Demonstrate the layout of the dowel joint using the try square and marking gauge.
2. Demonstrate the setting and use of the dowel jig and depth gauge for drilling the holes. Explain the necessity of always placing the face of the dowel jig on the same side of the board.
3. Demonstrate drilling the holes.
4. Demonstrate cutting a small groove in the side of the dowel to release the air and excess glue.

RABBET JOINT

1. Demonstrate how to layout a rabbet on both the end and edge of the stock.
2. Demonstrate how to set the saw blade.
3. Demonstrate the use of the miter gauge in making the shoulder cut on the end rabbet.

4. Demonstrate the setting of the blade and fence for making the balance of the cuts.

DADO AND GROOVE JOINTS

1. Demonstrate the layout for a dado and groove joint. Explain that the dado is usually made one third to one half the thickness of the board.
2. Demonstrate the selecting and installation of the dado head.
3. Demonstrate setting the height of the blade and cutting a dado using the miter gauge. If duplicate pieces are to be cut demonstrate the use of the stop block.
4. Demonstrate the procedure for cutting a blind dado.
5. Using the fence, demonstrate the cutting of a groove.
6. Demonstrate the use of the router plane and chisel to square up the end of the blind dado.

LAP JOINT

1. Demonstrate the layout of one of the lap joints.
2. With the dado blade in the machine, demonstrate the setting of the blade and the cutting of the lap joint.

MORTISE AND TENON

1. Demonstrate how to layout the mortise.
2. Using the dowel jig or drill press, demonstrate the removal of the excess wood.
3. With the chisel, demonstrate the completion of the mortise.

4. Demonstrate the layout of the tenon.
5. If the material is over 4" wide, demonstrate cutting the shoulder first, using the miter gauge and a stop block.
6. Demonstrate setting the blade and fence to cut off the waste stock from the tenon.
7. If the tenon is under 4" in width, demonstrate using the dado head to make the tenon.

TEACHING AIDS:

A. FILM:

Beveling, Mitering, Rabbeting, and Dadoing. Twenty minute black and white Wichita Board of Education film number 971.

The film demonstrates the use of the variety saw, with a movable table, in cutting a bevel, miter, and rabbet. It explains the type of blades used and their installation for cutting a dado.

B. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Eberhard Faber, Brooklyn 22, New York.

Chart, Standard Woodworking Joints.

WOOD FINISHING

MATERIAL:

Stain
Filler
Finish Material
Brushes
Brush Container
Sandpaper (Wet or Dry)
Steel Wool
Pumice Stone
Rotten Stone
Paste Wax
Water
Rubbing Oil
Felt Pads
Rags
Lumber (Several pieces well sanded and two finished)

PROCEDURE:

1. Demonstrate the application of the various stains.
2. Demonstrate the application of the filler, rubbing it in with the hand, and removal of the surplus.
3. Demonstrate the use of plastic wood and stick shellac.
4. Demonstrate the proper method of applying the finish with a brush, emphasizing the method used to avoid runs on the ends and edges.
5. Demonstrate the method of suspending the brushes in their proper container.
6. Demonstrate the use of steel wool for rubbing down small projects.
7. Demonstrate the use of the wet or dry sandpaper for smoothing the finish.
8. Demonstrate the use of pumice stone and rotten stone with water and oil depending on the type of finish desired.

9. Demonstrate how to apply the paste wax and buff it down with a soft cloth.

TEACHING AIDS:

A. SUGGESTED TEACHER CONSTRUCTED AIDS:

Using scrap lumber prepare several pieces of stock, approximately 3" X 5", and apply the various finishes most commonly used in your shop for each species.

This will help the student in selecting the type of finish he desires to use on his project.

B. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

M.L. Campbell Co., Kansas City, Missouri.

Stick shellac samples on a card.

CIRCLE SAW

MATERIAL:

Circle Saw
Blades
Wrench
Rule
Try Square
Sliding T Bevel
C Clamp or Hand Screw Clamp
Small Block of Wood
Lumber

PROCEDURE:

1. Demonstrate the installation of the blade. Emphasize setting the blade approximately 1/8 inch above the material to be cut.
2. Demonstrate setting the ripping fence with a rule for accurate cutting.
3. Explain the purpose of the guard and splitter and show their proper position before the machine is turned on.
4. Demonstrate where to stand and how to hold the board to prevent being hit in the event of a kick back.
5. Demonstrate ripping a board using the push stick.
6. Demonstrate checking the miter gauge for squareness and show how it is used for crosscutting and miter cuts. Emphasize the miter gauge and ripping fence are never used together because of the danger of kick back.
7. Demonstrate using the stop rod, or a block clamped to the ripping fence, for cutting several boards to the same length.

8. Demonstrate setting the saw blade to a specified angle by means of the sliding T bevel. Make a sample cut.

TEACHING AIDS:

A. FILM:

Beveling, Mitering, Rabbeting, and Dadoing. Twenty minute black and white Wichita Board of Education film number 971.

The film demonstrates the use of the variety saw, with a movable table, in cutting a bevel, miter, and rabbet. It explains the type of blades used and their installation for cutting a dado.

B. FILMSTRIP:

Woodworking Tools and Machines. Two films from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 13, 75 frames, Circle Saw Parts and Installing Blades

Film 14, 63 frames, Circle Saw, Setting Up and Operating.

Machines In Our Industrial Life. One film from a set of six colored films, Wichita Board of Education film number FS 905A.

Film 218, 49 frames, Circle Saw.

BAND SAW

MATERIAL:

Band Saw
Wrench
Blade
Jig
Large Dowel
Lumber (Scribe various types of cuts on the material)

PROCEDURE:

1. Demonstrate the installation of the blade, adjustment of the tension, and centering the blade on the wheels.
2. Demonstrate the adjustment of the guides including how the upper guide can be raised and lowered for various thickness of material.
3. Demonstrate where to stand and how to hold the stock, emphasizing the hands are placed on both sides of the blade and never in front of the blade.
4. Demonstrate the various cuts made on the saw including relief cuts when necessary. Explain the danger involved in trying to back out of a cut with the machine running.
5. Demonstrate the cutting of circular stock with a jig and the dangerous results if a jig is not used.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 6, 88 frames, Band Saw.

JOINTER

MATERIAL:

Jointer
Try Square
Sliding T Bevel
Lumber

PROCEDURE:

1. Demonstrate how to set the fence and adjust the front table for the desired depth of cut. Explain why the back table should never be moved.
2. Explain the need for determining the direction of the grain since the material is always run across the machine with the grain pointed toward the operator.
3. Demonstrate where to stand and point out that under no conditions should the machine be used without a guard.
4. Demonstrate how to surface the face of a board using the push stick. Emphasize a board less than ten inches long should never be run over the machine.
5. Demonstrate checking the fence for squareness with the try square and joint the edge of a board.
6. Demonstrate the jointing of end grain.
7. Demonstrate how to set the fence with the sliding T bevel for cutting bevels and chamfers.
8. Demonstrate the cutting of the rabbet joint.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 12, 83 frames, Jointer.

SURFACER

MATERIAL:

Surfacer
Lumber

PROCEDURE:

1. Demonstrate how to adjust the machine to the proper depth. Also indicate the amount of cut to be made.
2. Explain the need for determining the direction of the grain since the material is always run through the machine with the grain pointed toward the operator.
3. Explain, if there are several boards, the procedure of checking the grain on all the boards and laying them in a pile with the grain pointing away from the machine. Point out all the boards are run through the machine before changing the setting.
4. Demonstrate running the board through the machine and the board should have slight upward pressure applied to it as it comes out of the machine to prevent a dip from being cut in the end of the board. Emphasize stock less than ten inches should not be run through the machine.
5. Demonstrate how short stock should be run through at a slight angle and butted up against each other.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 11, 74 frames, Planer.

JIG SAW

MATERIAL:

Different Types of Blades Used
Lumber (Several pieces with circles and arcs scribed on them. Drill holes for internal cuts)

PROCEDURE:

1. Explain the different types of blades available in the shop and where each is used.
2. Explain the parts of the machine, how to install the blades, and how to adjust the machine.
3. Demonstrate the cutting along irregular lines and the cutting of relief cuts where necessary. Emphasize the fingers should be placed on both sides of the blade and never in front of the blade.
4. Demonstrate how to install the blade and the cutting of internal cuts.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 5, 93 frames, Jig Saw.

Machines in Our Industrial Life. One film from a set of six color films, Wichita Board of Education film number FS 905A.

Film 215, 55 frames, Jig Saw.

LATHE

MATERIAL:

Lathe
Face Plate
Turning Tools
Calipers
Backsaw
Hand Drill and Drills
Mallet
Straight Edge
Screws
Wax or Oil
Pencil
Sandpaper
Turning Stock

PROCEDURE:

1. Demonstrate how to mark the ends of the stock to find the center.
2. Demonstrate driving the live and dead center into the ends, if softwood is being used. For hardwoods, make two saw kerfs across the corners for the live center. If the point of the center is rather large it may be necessary to drill a small hole.
3. Demonstrate placing wax or oil on the dead center end and installing the stock in the lathe.
4. Demonstrate adjusting the tool rest slightly above center.
5. Explain how to set the machine for various speeds and how to select the correct speed.
6. Demonstrate the use of the three most common turning tools, the gouge, skew, and parting tool. Show how the calipers are used to check the diameter of the stock.
7. Demonstrate sanding the project in the lathe.

8. Demonstrate attaching the stock to the face plate.
9. Demonstrate attaching the face plate to the lathe and adjusting the tool rest.
10. Demonstrate face plate turning with the round nose turning tools.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. Two films from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 9, 86 frames, Lathe Parts and Spindle Turning.

Film 10, 73 frames, Lathe, Faceplate Turning and Other Operations.

B. MATERIAL OBTAINABLE FROM COMMERCIAL FIRMS:

Henry Disston and Sons, Philadelphia 35, Penn.

Chart, Disston Wood Turning Chisels.

DRILL PRESS

MATERIAL:

Drill Press
Bits
V Block
Drill Vise
Lumber (Laid out for drilling holes)

PROCEDURE:

1. Demonstrate how the belt can be changed on the pulley for various speeds.
2. Explain the type of bit shank used in the drill press.
3. Demonstrate the securing of the bit in the chuck.
Emphasize the key should never be left in the chuck under any condition.
4. Demonstrate how to adjust the table and the depth gauge.
5. Explain the need for keeping the piece of lumber on the table to protect the table.
6. Demonstrate the use of the various bits available in the shop.
7. Demonstrate the use of the V block and drill vise.

TEACHING AIDS:

A. FILMSTRIP:

Woodworking Tools and Machines. One film from a set of fourteen films, Wichita Board of Education film number FS 971.

Film 4, 81 frames, Drill Press.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The following chapter will summarize the content of this study, give the opinion of the writer in the conclusion, and make recommendations for further studies.

SUMMARY. The preceding chapters have presented the problem, reviewed previous studies by Ledbetter, Olive, and McNutt, given a condensed history and philosophy of visual aids, and developed demonstration sheets and visual aids to be used in teaching woodwork.

Early history reveals how primitive man conveyed his ideas and methods of survival by means of drawings, demonstrations, and field trips. Sculpture and field trips were also used by the Greeks and Romans in their educational system.

Some of the early educators advocated the use of visual aids in education. John Amos Comenius conceived "the child perceives through the senses, everything in the intellect must come through the senses." (1, page 36) Jean Jacques Rousseau opposed the theory that the knowledge of the things of the world could be secured through a study of words and books. He made sense perception fundamental in elementary education and advocated a varied experience through firsthand

contact and manipulation. Pestalozzi wrote vigorously against teaching words and phrases children did not understand and recognized sense impression as the real foundation of our knowledge.

The development of the museum and the invention of the photograph, microscope, telescope, motion pictures, and television, are a few of the many means modern science has given us to bring new experiences into the classroom.

When verbal symbols are memorized, and not understood, they are easily forgotten because the student does not associate the word with anything concrete. Visual aids can help decrease the amount of forgetting by offering the necessary concrete experience.

Visual aids cut across language barriers as they are understood by almost everyone. To have good instruction there must be successful inter-communication of ideas between the teacher and pupil. Often times language concepts are not adequate for giving complicated directions. However, the use of visual aids alone is not enough, the student must be taught how to observe, and how to study objective materials.

The major portion of the study was devoted to developing demonstration sheets to correlate with the course of study for woodwork in the junior high schools, Wichita, Kansas. The demonstration sheet also includes suggested teaching aids the instructor can construct, a synopsis of the films, in the Wichita Film Library for each unit, and lists some of the visual aid charts which are obtainable from commercial firms.

CONCLUSIONS: The history of visual aids will verify the fact that they have always been a part of our learning process. They have established themselves as a very important element in our present educational system, making rapid growth since World War II. Their importance is confirmed by the number of colleges offering special courses in the use of visual aids.

Visual aids are not designed to replace but rather supplement and enrich the other methods of teaching. They should be used in harmony with the established units, and then only when there is a definite need for them or they will become a form of entertainment. They are a stimulating environment for producing an atmosphere of work and preventing lulls in the student's interest. When using this valuable tool it is necessary for the teacher to thoroughly understand their purpose and to do considerable planning in advance.

RECOMMENDATIONS: There is a definite need for an organized effort to make better use of the various types of visual aids in industrial arts. This study is to be used as part of a teacher's guide. Only a small portion of the teaching aids that can be constructed or obtained from commercial firms are listed. Therefore, it is the writer's hope that committees will be formed to develop new teaching aids and help compile a complete list of available teaching aids and where they may be obtained.

A SELECTED BIBLIOGRAPHY

1. Bennett, Charles Alpheus, History of Manual and Industrial Education Up to 1870, The Manual Arts Press, Peoria, Illinois, 1926, 461 p.
2. Dorris, Anna Verona, Visual Instruction in the Public Schools, Ginn and Company, 1928, 477 p.
3. Ericson, Emanuel E., Teaching Problems in Industrial Arts, The Manual Arts Press, Peoria, Illinois, 1930, 433 p.
4. Ericson, Emanuel E., Teaching the Industrial Arts, Chas. A. Bennett Co., Inc., Peoria, Illinois, 1956, 384 p.
5. Kinder, James S., and McClusky, F. Dean, The Audio-Visual Reader, Wm. C. Brown Company, Dubuque, Iowa, 1954, 382 p.
6. Ledbetter, James Luther, Visual Aids Furnished by Commercial Firms for Use in Industrial Arts Classes, Thesis, Oklahoma State University, 1935, 141 p.
7. McKown, Harry C., and Roberts, Alvin B., Audio-Visual Aids to Instruction, McGraw-Hill Book Company, Inc., 1949, 608 p.
8. McNutt, John William, Audio-Visual Aids in Industrial Arts, Report, Oklahoma State University, 1956, 38 p.
9. Olive, William Thurmond, The Use of Projected Pictures For Industrial Arts Teaching, Report, Oklahoma State University, 1950, 59 p.
10. Parker, Samuel Chester, The Textbook in the History of Modern Elementary Education, Ginn and Co., 1912, 505 p.
11. Struck, F. Theodore, Creative Teaching, John Wiley and Sons, Inc., New York, 1938, 623 p.
12. Wilber, Gordon O., Industrial Arts in General Education, International Textbook Company, Scranton, Pennsylvania, 1948, 362 p.

VITA

Robert J. Lehr

Candidate for the Degree of
Master of Science

Report: Visual Aids Correlated With the Course of Study
for Woodwork in the Junior High Schools, Wichita,
Kansas.

Major Field: Industrial Arts Education

Biographical:

Personal Data: Born February 11, 1924, El Dorado,
Kansas.

Education: Attended grade school in El Dorado, Kansas;
graduated from El Dorado High School in 1941;
undergraduate study, El Dorado Junior College,
1941-1943; received Bachelor of Science Degree
from Pittsburg State Teachers College, Pittsburg,
Kansas, 1948.

Experiences: United States Navy, 1943-1945; taught
Industrial Arts at Cathedral High School, Wichita,
Kansas, 1947-1950; worked for the Boeing Airplane
Company in Wichita, 1950-1953; taught Industrial
Arts at Mathewson Junior High School, Wichita,
1953 to the present time.

Organizations: Member of the Kansas State Teachers
Association, National Education Association,
Wichita City Teachers Association, Kansas Indus-
trial Education Association, Kansas Vocational
Association, Student Industrial Arts Club, and
the Red Red Rose.

REPORT TITLE: Visual Aids Correlated with the Course of
Study for Woodwork in the Junior High Schools,
Wichita, Kansas

AUTHOR: Robert J. Lehr

REPORT ADVISER: Cary L. Hill

TYPIST: Joyce K. Olson