THE ORGANIZATION AND CONSTRUCTION OF FILM SLIDES AS AN AID TO INSTRUCTION IN THE GENERAL SHOP

by

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I N T R O D U C T I O N

Since the beginning of formal schooling, verbalism has been the chief tool in the teaching of children. Pictures were used in the earlier forms of education as well as other concrete objects, but when printing was developed, the tendency was to use the printed page to supplement the teacher's lecture. Men like Comenius, and Rosseau were not in favor of having the child learn through words alone. Comenius' book, Orbis Pictus, was probably the first text-book to use illustrations. Pictures, models, field trips and the printed page were the visual aids of early education, of which the printed page was the most widely used. Visual education received considerable impetus when the motion picture was developed. Administrators and teachers alike saw in the motion picture a very valuable teaching aid. Along with the development of the motion picture, a great many other visual aids were perfected, such as: slides, sterographs, film slides, color pictures, etc. All of these are being accepted by the teachers as very necessary to the teaching of children in a complex society.

Certain areas of the school curriculum have had a more abundant supply of visual material than others. Geography,

nature study, and the sciences have been able to adapt much commercial material to classroom use. Industrial arts has used some commercial material for background and for related information, but very little material has been made available to the teacher for the teaching of certain fundamentals or procedures.

Statement of the Problem.

Approximately three years ago, 1936, the writer was employed to teach general shop in the Portland Public Schools. The type of shop was one in which a variety of activities were to be taught during the class period. It was one of the purposes of this type of organization to provide, in so far as possible, for the individual interests and needs of the pupils. The problem immediately arose as to how the teacher could give instruction in so many activities during the same class period. It was this problem that led to the study of providing individual instruction through the use of film slides. The study was, therefore, titled The Organization and Construction of Film Slides as an Aid to Instruction in the General Shop.

Purpose of the Study.

For many years educators gave very little thought to the problem of individual differences. The child was thought of as a structural organism which could be molded

into anything the teacher desired. Instruction was given and all children were expected to react in exactly the same manner. Little thought was given to the idea that pupils might differ in interests, abilities and capacities.

Developments in educational research brought to light many interesting facts concerning the child as an individual. Children were found to differ in interests, abilities, capacities, etc. This fact has caused a very marked change in our methods of teaching, and even in the organization of the school curriculum. Instruction, instead of being formal and fixed, now gives way to a more flexible program in which the individual has a chance to develop and grow to the fullest extent of his abilities. The pupil is not required to read from one or two books only, but he is encouraged to use whatever sources may be available to him. The fast student is encouraged to broaden his knowledge of the field in which he is working while the slow student is encouraged to work up to his optimum rate. No effort is spent in attempting to keep students together. Individual instruction in a large class is always a big problem of the teachers. Relative to this point Hockett and Jacobsen (1) say:

> Admittedly the teacher's greatest problem is that of meeting the needs of individuals

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1 Hockett, John A. and Jacobsen, E. W. Modern Practices in the Elementary School. p. 245

> while dealing with large groups. Yet the two tasks are not completely incompatible. Successful teachers have found many methods of varying classroom programs in order to individualize instruction.

In industrial arts instruction, the problem of providing individual instruction is one which presents many difficulties. Pupils vary, in the amount of experience they have had before entering the industrial arts shop, in innate ability, in interest and in many other respects. All of these will tax the teacher's resourcefulness in making the most of any methods, procedures, or devices to enable him to provide for individual instruction. The purpose of this study is to present a method by which the teacher may in some measure allow for individual differences.

The Method.

The method consists of a series of film slides of different projects that might be made in the industrial arts shop. These film slides give the pupil an overview of the project. The slides give the pupil an idea of what will be required before he starts the particular job he has selected. Often a boy has a spontaneous interest in making a particular job, but he has no conception of the amount of work involved. The slides do, in some measure, show him in a sequential order just what is required to complete the job. In this way the pupil has an opportunity to

analyze the project and from this analysis decide whether he wants to start the project. The slides also serve to start the pupil on the job when once his decision has been made. These slides are used by the teacher for presentation and review or by the pupil in self-instruction. This study does not try to set forth this particular method as the best method or as the only method of self-instruction, but rather it tries to present another aid which the teacher may use in his classroom to assist him in developing the pupils' abilities and capacities to their optimum.

Procedure in Making the Study.

The projects to be photographed were first selected. Only the projects which seemed to be consistently selected by the pupils from term to term were used in the selection and from these the writer chose three to be used in this study. When the projects had been decided upon, an analysis of the major operations involved was made. These analyses were sent out to eleven experts in the field of industrial arts. Only raters were included who had at least five years teaching experience and had showed advancement in the industrial arts field through the position held and through their writings. The eleven raters chosen held the following positions:

1. Head of industrial arts department in a college.
2. College professor of industrial arts.

3. College instructor of industrial arts.
4. Associate professor of engineering.
5. Graduate student in industrial arts.
6. Industrial arts instructor in a junior high school.
7. Supervisor of industrial arts in a large city.
8. Four industrial arts instructors in high schools.

Each rater was to judge whether or not in his judgment the analyses were adequate for the project. If in the rater's opinion any steps needed to be rearranged or omitted or others added, he was to make a note on the blank. When the blanks were returned, all suggestions were taken into account in making up the final analysis form.* This analysis form was used as the guide in photographing the operations involved in the projects.

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*Copy of the analysis form appears in the appendix.

CHAPTER II

H I S T O R I C A L B A C K G R O U N D

Brief History of the General Shop.

Industrial arts is a relatively new subject in our school curriculum. It was first brought into the schools for the imparting of tool technique to engineering and science students to prepare them better for following their professions. One of the first men to recognize the value of "manual training" as it was then called was Woodward of Washington University. He found that many of his students in applied mechanics at Washington University did not have any knowledge of the use of tools. He set out to teach them the use of these tools and it was not long until he found that these so-called shop courses might have an important place in the general education of the youth, but he did not openly advance this theory at the beginning of his work. Relative to this point Friese (1) says:

> In 1873, before the founding of the Manual Training School, Woodward advocated the introduction of handwork instruction as a part of the education of all boys regardless of their educational aims. On this ground he has been considered the real father of manual training. The school he established in 1879, however, was not organized for the purpose of giving handwork as a part of cultural education. He could not have

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1 Friese, John F. Exploring the Manual Arts. p. 13

> secured the funds for its establishment on such a basis. The instruction in tool processes was, like the Russian, an application of the theory of formal discipline to trade instruction.

At about the same time Runkle of Massachusetts Institute of Technology had visited the Centennial of 1876, in Philadelphia, and had observed the handwork of the Russian Schools. He saw there the things he had been looking for to use in training his engineering students. On his return from the exposition, he immediately set about organizing a course in shopwork for his mechanical engineering students. Later he also developed a "School of Mechanic Arts", which could be elected by other students who were intent on entering industry rather than scientific engineering. He also believed that shopwork had a definite place in general education. Runkle (2) once said, "At the same time, I believe that this discipline could be made a part of general education, just as we make the sciences available for the same end through laboratory instruction."

It is quite evident that "manual training" was thought of in its earliest beginnings as a vocational subject for the purpose of imparting skill in tool technique, although some of the far-sighted educators saw in "manual training" a very valuable addition to the general education of the child. It was not until 1900, that "manual training" was

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2 Bennett, Charles A. History of Manual and Industrial Education 1870 to 1917. p. 321

actually beginning to be accepted in the general education program. At this time leaders and teachers in "manual training" began to widen their scope and place less emphasis on the vocational and skill side of the subject. Instead of working only with wood, teachers began to present other phases of industrial work such as: metal, electricity, leather, etc. The tendency was to put more emphasis on the artistic side of the project on which the pupil was working. From this movement, there came the word "manual arts". Warner, Bollinger and Hutchinson (3) give the following definition:

> A term used to describe such subjects as woodworking, mechanical drawing, metal work, printing, leather work, jewelry making, clay work, book-binding, etc., when taught as a form of general education having for its chief purpose that of developing within the pupil, through work in the school shops, manual skill and an appreciation of good design and construction by practice with a variety of exercises and practical projects of personal value.

"Manual arts" was now beginning to be recognized as a very valuable subject in the general education of the child. About 1910, the junior high school movement began to get under way. The junior high school with its emphasis on

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3 Warner, W. E., Bollinger, E. W., Hutchinson, H. H. and others. The Terminological Investigation of Professional and Scientific Terms from the Literature of Vocational and Practical Arts Education. p. 29

exploration had a very marked effect on "manual arts". Exploratory courses were now offered which placed emphasis on knowledge and information concerning the different fields of industry. A new term "industrial arts" was now use to supplant "manual arts". Warner, Bollinger, and Hutchinson (4) define this term:

> Industrial Arts is one of the Practical Arts, a form of general or non-vocational education, which provides learners with experiences, understandings, and appreciations of materials, tools, processes, products and of the vocational conditions and requirements incident generally to the manufacturing and mechanical industries.

With such a broad conception of industrial arts, many schools found that they were financially unable to provide such a variety of shops. To take care of this difficulty the general shop was developed. In large systems they could well afford a unit general shop, i.e., a shop for each separate activity; however, in a small system this was not practical. A comprehensive general shop was developed to take care of this need. Newkirk and Stoddard (5) say:

> The comprehensive general shop, which houses a number of small related divisions under the direction of one teacher, is widely used and will give a small community with limited funds an opportunity to offer a rich course in the industrial arts. For example, a comprehensive general shop may

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4 Ibid. p. 27

5 Newkirk, Louis V. and Stoddard, George D. The General Shop. p. 13

have instructional divisions in metal-work, woodwork, auto mechanics, concrete work, plumbing, finishing, and drawing.

The general shop gives the pupils an opportunity to explore and have experience in a wide range of activities. It does, in a large measure, make allowance for the individual differences of the pupils. The industrial arts program should provide for as large a range of activities as possible under the existing school conditions. A recent United States Department of the Interior bulletin (6) states:

> The school shop, for example, can no longer justify its program if youngsters only make traditional objects out of wood and then take them home as they did a generation ago. Functions of the modern program require a much more significant contribution. Such programs now provide for:
>
> 1. Activities in as many industries as school shops and laboratories will permit.
> 2. Use of typical and important industrial tools.
> 3. Experience in production methods.
> 4. Experience in handicrafts.
> 5. Acquaintance with the organization and operation of industrial and commercial enterprises.
> 6. Study of safe and hygienic ways of doing all types of work.
> 7. Practice in identifying the more important methods employed by industry.

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6 United States Department of the Interior. Industrial arts - Its Interpretation in American Schools. p. 9

8. Selection and use of some of the common products of industry.

9. Utilization of salvaged materials or products for project work.

10. Interpretation of the sources, principles, and applications of power, such as steam, water, internal combustion, and electricity.

11. Study of the origins and effects of significant inventions.

12. Study of materials from source to completed object.

13. Study of vocational opportunities, living conditions, remuneration of workers, controversial questions pertaining to capital, labor, and technology.

It is evident that from such a broad interpretation of industrial arts, the pupils will be allowed to develop their individual interests and capacities, and at the same time be working in a natural situation. In this type of organization, the teacher will of necessity resort to devices, such as, instruction sheets, models, films, slides, etc., in order to help him guide the pupils in their activities. Visual aids of all types can be used by the teacher to make his work more effective and of more interest to the pupils.

The chart on page 13 presents in a more concise form the development of industrial arts from its earliest beginnings in America, up to the period of 1910. The chart serves as a summary of the previous discussion on the development of industrial arts in America.

Development of Industrial Arts in America
(After Warner, W. E., Bollinger, E. W., Hutchinson, H. H., and others)

	MANUAL TRAINING 1876	MANUAL ARTS 1896	INDUSTRIAL ARTS 1910
Inception:			
Influence:	Della Voss, Runkle, Woodward	Bennett, Salomon, Griffith	Bonser, Dewey, Bigelow
Skill:	Artisan basis, Tool mastery	Craft basis, "Technics"	Individual basis "Development"
Methods:	Dictated exercises	Assignment of useful artistic projects	Projects and individual creativity
Content largely:	Work in wood, Mechanical drawing	Arts: Graphic, plastic, textile, Mechanic, Book-making	Any representation of modern industry conditioned by stated objectives
End functioning:	In itself	Avocational, nice to have done, development of appreciation for the crafts	Exploration, Development of personal-social traits, Guidance, consumer education
Basis of truth:	Authority	Authority and custom	Scientific evidence and criteria
Centers in:	Teacher	Project	Pupil
Unit:	Unit-shop	Unit or general-shop	Laboratory of industries or unit-shop

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7 Warner, W. E., Bollinger, E. W., Hutchinson, H. H. and others. Op. Cit. p. 12

Brief History of Visual Education as related to the General Shop.

The present tendency toward the use of more visual material may lead us to think that visual instruction is a new thing in education. As a matter of fact, visual instruction is as old as man himself. Through the use of pictures, ancient man has been able to pass on to future generations a great deal of knowledge about the culture of his time.

Visual aids are not new to the industrial arts teacher because the very nature of this type of teaching demands that a great deal of the teaching be done by the use of visual aids, such as, models, demonstrations, etc. The early craftsman passed on his trade to the young apprentice by teaching him the fine points of the craft which the apprentice had chosen to follow. There is no doubt that the master craftsman used many visual aids. Models of joints and patterns of all types were used so that the master could more easily teach the young worker how to proceed with his work. Very prominent visual aids in these early day shops were mechanical drawings and sketches. The drawing probably has always been used and will continue to be one of the most important aids to the shop teacher. Through it, ideas can be illustrated in a much more concrete way than could be expressed through the medium of words.

When education became more formal and the function of educating children was turned over to the school, there was a trend toward the use of the printed page as the only visual aid. Men like Comenius, Pestalozzi, Rousseau, and Froebel expressed the idea that children should be brought in contact with concrete objects as they could learn more about them than just sitting and reading. The "manual arts" program gave the child an opportunity to deal with concrete objects. When shop teaching was brought into the schools, there was a greater demand for visual aids. Pestalozzi in his early schools used many types of visual instruction, such as, drawings, woodcuts in textbooks, excursions, and models. In discussing drawing, Pestalozzi (8) said:

> But drawing, as a help toward the end of instruction, making ideas clear, is essentially bound up with the measurement of forms. When to a child an object is given to draw, he can never use his art as should, that is as a means of rising through vague sense-impression to clear ideas in all his education, until he can represent the proportions of the form, and express himself about them; nor can his art have that real value that it might and should have, were it in harmony with the great purpose of education.

The preparation of visual aid material for a long time depended upon the teacher's drawings or sketches. This was

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8
Bennett, Charles A. History of Manual and Industrial Education up to 1870. p. 120-121

many times a laborious and tedious job. With the development of photography, a new and easier method of making material more vivid and real to the pupils was made available to the teacher. Textbooks began to appear with pictures which gave added meaning to the written material in the book. Shop textbooks began to use illustrations of projects and procedures. The pupil could, through the medium of pictures, get a better understanding of the use of tools. Complicated processes were made easier to understand through the use of a few pictures.

Shortly after the development of photography, the lantern slide projector was introduced. It was now possible for the shop teacher to project a picture or series of pictures on the screen, which would enable all the members of the class to see. Related and instructional information could be presented to the class through the medium of slides. Through the use of the slides, the teacher was able to take his class to the forest, to the mine, or to the manufacturing plant without even leaving the classroom. Dorris (9) says concerning related information in industrial arts:

> Although the major part of work in the manual arts involves actual experiences in construction and manipulation, the work may be greatly enriched by the use in the classroom of pictorial charts, slides and films.

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9 Dorris, Anna V. Visual Instruction in the Public Schools. p. 349

Following the introduction of the slide projector, the motion picture was developed. The motion picture is thought by many as having influenced human behavior as much as any other communicative agency. Relative to this point Hoban, Hoban, and Zisman (10) say:

> No single communicative medium in the world's history has so universally influenced human behavior as has the motion picture. Through the ages religion has had its great preachers, its beautiful cathedrals, its dramatizations, and its stained glass windows, its ceremonies, and its dogmas. But here the influence on emotions and other patterns of behavior has been a combination of experiential media. Today patterns of children's play, patterns of dress, patterns of attitudes, patterns of speech, patterns of morality, patterns of life conduct are all influenced to some extent by the motion picture.

The motion picture has given the teacher a very valuable aid. Industry, science, agriculture can now be brought vividly into the classroom. The latest addition of sound has made the motion picture even more real and lifelike. The industrial arts teacher can, through the use of the motion picture, present many sides of our industrial life in a more interesting and vivid way.

Visual aids are of great value to the general shop teacher because of the variety of instruction that is offered. Films, slides, models, charts, etc., are all necessary to the teacher if he is to help pupils to develop

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10 Hoban, C. F., Hoban, C. F. jr. and Zisman, S. B. Visualizing the Curriculum. p. 93

an understanding and appreciation of the highly complex and industrialized society in which we live. Dorris (11) says:

> If the school is to make any attempt to keep pace with life, and to meet the definite needs of society, it must take advantage of every valuable contribution of modern science and invention as it is perfected, so that it may fulfill its function with increased economy and efficiency and enhance the joy of living ...School and life must be one and the same, and modern school procedure must be up-to-date and progressive.

11
Dorris, Anna V. Op. Cit. p. 9

CHAPTER III

THE STUDY

In any teaching method it is necessary for a teacher to evaluate and determine what instruction is to be offered in the presenting of material to his pupils. The industrial arts teacher will of necessity have to decide upon which areas of work he will offer in a particular class. Projects will have to be set up from which the pupil may choose or the pupil may present a project of his own to the teacher for approval. In either case the problem of which projects will offer the pupil a chance for greatest development will have to be decided upon.

The Projects to be Filmed.

In the very beginning of this study, it became evident that the writer would have to decide on what projects were to be used in making the study. Over a period of time the teacher of a general shop finds that there are a certain number of projects that seem to be selected from term to term by the pupils. This may be due to the pupil's observation of models in the shop, through the contact with other boys who have made similar projects, or through acquired interest in the project. For purpose of this study, only three projects have been selected in three different phases of general shop: woodwork, metal, and leatherwork. It was

felt that these three would give good examples of the use of film slides in the general shop. These projects have appealed to boys of the junior high school age and have been consistently selected from term to term in the writer's shop.

Analysis of the Projects.

After the projects had been decided upon, a tenative analysis of each project had to be made. The purpose of the analysis was to have the job broken down into suitable teaching units. It was not the purpose of the analysis to break the job into its smallest parts, but rather to break it down in such a manner that it could be presented to the student in order that the pupil would have an understanding of what was to be done. Selvidge and Fryklund (1) say:

> One of the most fundamental things in good teaching is the definite and proper assignment of the lesson or task. The pupil is entitled to know what he is expected to learn. He is given a job to do, not because we want something made, but because we want him to learn certain things, and he will have an opportunity to learn them in doing this job. If we have analyzed the job for the learning units, it is a simple matter to take from the Analysis-Chart a list of the learning units involved.

The chart was made up according to what the writer thought was the best possible order for the presentation of the

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1 Selvidge, R. W. and Fryklund, V. C. Principles of Trade and Industrial Teaching. pp. 96-97

projects. One factor, considered seriously, in the analysis was that of not breaking the job down into such small detail that the pupil would become confused. Only units that had a definite bearing on the probability of pupil's understanding of the project were included. These steps were then put down in sequential order, as shown by the chart on steps in making a leather coin purse.*

The writer's order was listed first and two columns left blank so that the raters could revise, add, or eliminate any steps in the analysis. The three analyses were sent out to the raters with a letter of explanation on what was wanted. When the blanks were returned, each suggestion offered was taken into consideration in making the final analysis form. Wherever the raters seemed to disagree, the writer chose the suggestion offered by the greatest number of raters. Many helpful suggestions were offered by the raters, and any added steps that were suggested were incorporated into the final analysis form. This revised form was used as a guide to direct the photography of the pictures which were to be made into film slides. The pictures shown on pages 22-25, and those in the appendix were made into film slides. The captions below the pictures are the titles on the film slides.

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*See pp. 22-25

Steps In Making A Leather Purse

1. Cut Out Pattern

2. Trace Pattern On Leather

3. Cut Leather

4. Dampen Leather

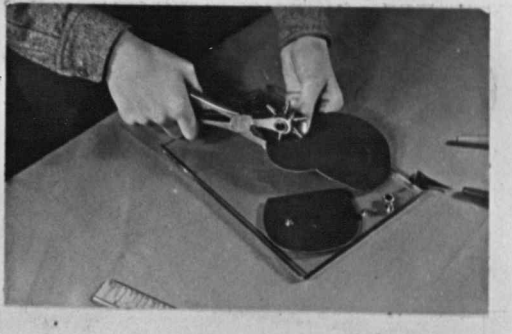
5. Fasten Pattern To Leather

6. Trace Design On Leather

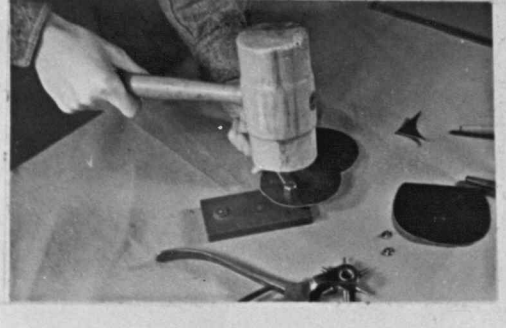
7. TOOL LEATHER

8. STAMP BACKGROUND

9. SKIVE EDGES



10. PUNCH HOLES FOR SNAP



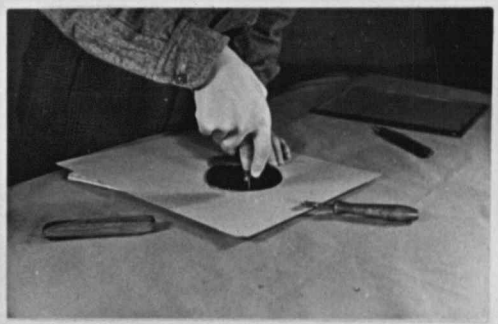
11. SET SNAP (CAP)

12. SET SNAP (SPRING)

13. Apply Rubber Cement

14. Crease Edge

15. Lay Out Stitches



16. Punch Holes For Thread

17. Sew Purse

18. Clean Leather

19. Apply Dye

20. Apply Wax

21. Polish

22. Have Project Checked

23. Finished Project

Use of Film Slides in Instruction.

After the slides were completed, the writer made use of them in several ways in his classes, such as:

1. For the presentation of projects
2. For class demonstration
3. For individual instruction
4. For review

At the beginning of each new term, the question of what projects to present and how to make the explanation clear to the pupils is an ever present one. The teacher may have a group of models which the pupils can examine and from this group select projects that they would like to work out during the term; however, the writer has found that pupils often select projects that are beyond their abilities. The film slide offers a very valuable aid to the teacher in this respect, in that a pictorial overview of the project is presented to the pupil. In this way the pupil gets a better understanding of what will be required of him if he expects to complete the project. Often times the completed model will seem relatively simple to the pupil, the film slides will give him a better chance to actually see the steps necessary in order to complete the projects. The pupil will have a better opportunity to evaluate his abilities in terms of what is required and then decide whether he wants to select the project or not. The writer has found that it presents to the pupils a more vivid

explanation of the projects than by verbally trying to explain each project to the group.

The demonstration method has always been one of the best ways in which to present material to a class in industrial arts, but many times it is not profitable to demonstrate a project to a class for the benefit of a few pupils that may be interested. Many projects may be handled as efficiently through the film slide method, supplemented of course by the teacher's demonstration and other aids, in difficult phases of the project. It requires approximately six hours of demonstration time over the term to demonstrate the making of the tin boat,* but through the use of the film slide it can be presented to the pupils in a space of a few minutes, perhaps a maximum of ten minutes would be required. Many times a boy may be absent from class or did not understand a particular part of the project fully. The film slide gives the pupil an opportunity to look over the particular step without any redemonstration on the part of the teacher.

The problem of individual instruction is one which is ever present in all phases of teaching. The industrial arts teacher, like all other teachers, is always striving to perfect methods, aids, etc., to make allowance for these

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*Pictures appear in the appendix.

individual differences. Sowers (2) says:

> The search for better methods of instruction in industrial arts work has been constant and persistent. New and improved methods have been made necessary by the demand that larger and larger classes be taught; by the often seemingly necessary mixing of grades; by the necessity of allowing pupils to progress at different rates of speed, and to recognize individual differences; and by the teacher's desire to do more and more individual instruction and less class work.

In this kind of a situation the film slide will be of a great help to the teacher, in that the pupils can take the film slide of the project that they wish to make and view it on the screen, either individually or in groups who are doing like work. The writer has found that the faster pupil will need only to see the pictures once or twice while the slow pupil may have to view each step as he progresses with the project. The film slide for the poor reader has the added advantage of presenting the material visually, which he might not be able to get from the printed page. Many times the pupils observe a demonstration and even though the teacher may not go too rapidly for the fast pupil, the slow pupil is lost after the first few steps. The film slide is of great value in giving the pupil a chance to review the operation or the whole procedure with the minimum of teacher effort.

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2 Sowers, J. I. Woodworking Through Visual Instruction. p. 9

Often times the instructor wishes to review a particular part of a project with an individual or a group, but finds that a great deal of time will be consumed in redemonstration compared to the value the students will receive from the redemonstration. The film slide solves this problem quite adequately. The teacher can in a few minutes project an enlarged picture of the operation or operations involved in the project and thus save both pupil and teacher time.

Some teacher may raise the question as to whether or not the projects should be broken down more so as to give the pupil more of the operations involved. One must keep in mind that one of the purposes of education is to develop pupils who can think, analyze and follow a problem to a conclusion. "The method of instruction employed in industrial arts - the direct solution of a real problem in a realistic situation - gives an opportunity to experience the thrill of planning a job and seeing it through to a logical conclusion."[3] The film slides should not try to present everything involved in the project. The pictures should give the pupil an insight into the problem and then the pupil should proceed to work out the details for himself. The child should be made to feel the responsibility of planning his work with the teacher as a guide to direct

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[3] State Department of Education. State Course of Study, Industrial Arts for Secondary Schools. p. 9

his plans and work.

During the past year the writer has used this method of instruction a good deal, and although the number of film slides completed has not been great, the pupils have received this method of instruction with a great deal of enthusiasm and interest.

Evaluation of Method.

Many teachers have the tendency to evaluate a particular method by grading the finished project. By the project is meant the task that the child has completed. It often happens however that the pupil who has not done the best work obtains more out of the project than the pupil who has more innate ability. The writer feels that the quality of the finished project has very little to do with the merit of the method used.

The instrument used in the evaluation of film slides as a method of instruction was the rating scale.* A rating scale was made to encompass what the writer, and those who helped him, believed a method should contain in order to contribute to the better understanding of the project by the pupils. The scale was made on a five-point basis. The questions were of three general types: psychological, pedagogical and technological. There was no attempt made

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*See Rating Scale in Appendix.

to group these questions into groups as it was felt that a better rating would be obtained if the rater could mark each question irrespective of the preceeding question. The rater was to put an X at the point where he thought the particular question stood in the five-point scale. Thirty of these questions were made out and sent to ten raters with a letter* of explanation as to what was wanted on the rating scale. The writer tried to select people who were sincere in purpose and had experience in the field of education. The raters were chosen from all fields of education from the elementary school to the college level, as it was thought that in this way a more valid evaluation of the method could be made. The raters included:

1. One supervisor of visual education
2. One head of department of industrial arts
3. One professor of education
4. One high school industrial arts instructor
5. Two elementary school industrial arts instructors
6. One head of department of research
7. Two elementary school principals
8. One supervisor of industrial arts

All of these raters had previously observed the writer's method and had a good understanding of what the method

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*Copy of letter and rating scale appears in the appendix.

consisted. Many of the raters took the time to comment and gave very helpful suggestions.

When the rating scales had all been returned, an average of each question was found and a profile graph* made of all the questions. In the opinion of the raters certain phases of the method stood out as significant. The majority of the raters seemed to think that the method of teaching with film slides had its greatest value in review, in vizualization of the project, in breaking down the project into its component parts, and in aiding the teacher in presenting a large number of projects at the same time.

The raters were of the opinion that the method did not have as much value in stimulating the pupils to read, making the pupil stay with a project until completed, in developing cooperation, and in developing accuracy. The remaining questions on the scale received close to an average rating. Most of the raters gave the method a very favorable rating as can be seen by the profile graph. Very few of the means fell below the middlepoint on the rating scale. Many of the raters took time to give comments on the favorable and unfavorable points of the method. The following are some of the comments given by the raters:

> I feel that this method of instruction can be made a very useful device for supplementing

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*See pp. 34-35

the usual instruction, and will assist greatly in handling diversified groups. It will not, however, replace the ordinary type of instruction, but will help eliminate the necessity for repetition.

I believe the whole idea is a very good one, and looks to me to be practical and workable.

An excellent aid for the general shop teacher, but it would not be very satisfactory unless one could make his own film slides or have them made at reasonable cost.

This combination of visual instruction with the unit-project idea is a very happy one.
From the child's standpoint, it develops initiative, stimulates as well as provides for varieties of interest, exercises observation and encourages industry.
From the teacher's standpoint, it solves the problem of individualized instruction, allows for variation in speed, establishes models of correct technique, and affords training in self-reliance and concentration.

The plan seems to be an excellent one, but probably has some disadvantages. I would like to suggest the following:

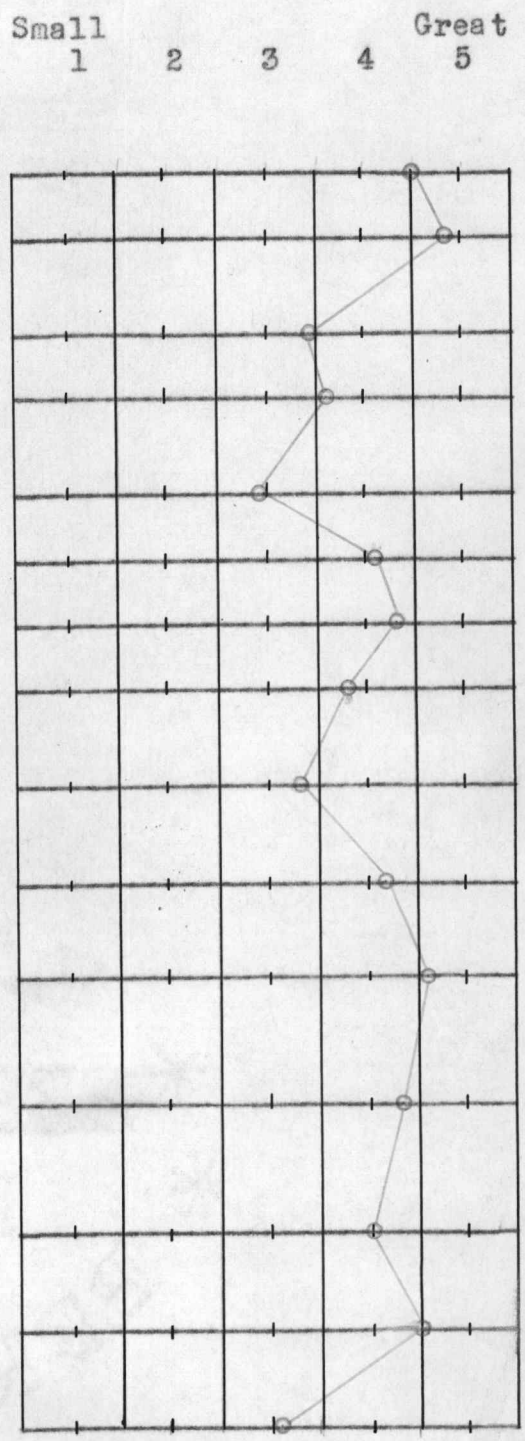
1. Difficulty in obtaining film slides
2. Cost
3. Possibility of stifling originality in projects which seem to be such a source of enthusiasm, especially for the teacher.

Most of the raters felt that the method would not supplant any other method, but that it did have a very important place in helping the teacher handle the problem of individual instruction.

Profile Graph of Means, based on

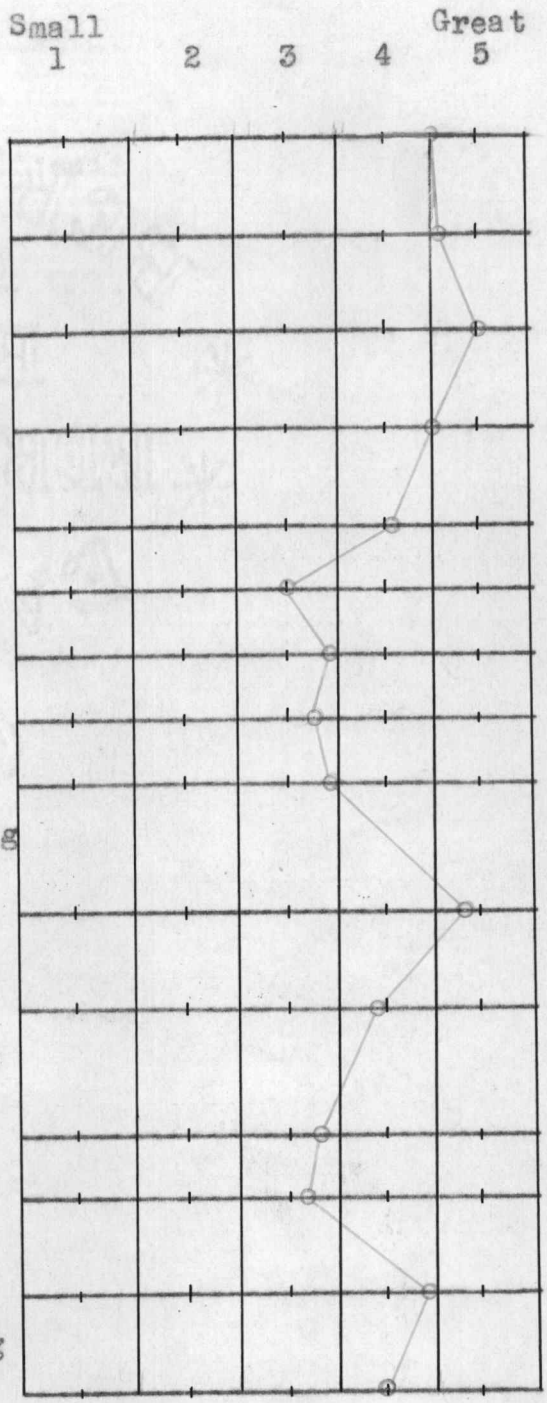
Ratings of Ten Experts in the Field of Education

To what extent should this method:



1. Aid the teacher in demonstration?
2. Aid in review?
3. Make the pupil think for himself?
4. Develop initiative?
5. Stimulate desire to read for further knowledge?
6. Motivate the student?
7. Help the poor reader?
8. Improve self-discipline?
9. Inspire the pupil to do his best work?
10. Allow for the range in the pupil's abilities?
11. Give the teacher time for individual instruction?
12. Develop in the pupil the habit of orderly method of procedure?
13. Develop confidence in the pupil in approaching a problem?
14. Develop ability to follow instructions?
15. Make the pupil stick to the task until it is finished?

To what extent should this method:



16. Hold the pupil's interest?
17. Help the student to approach the project?
18. Help the student visualize the project as a whole?
19. Give the student an idea of the amount of work involved?
20. Stimulate interest in the project?
21. Develop cooperation?
22. Replace instruction sheets?
23. Prevent wasting material?
24. Develop proper use of tools?
25. Aid the teacher in presenting a variety of projects at the same time?
26. Promote class and group discussion?
27. Point out to the student his deficiencies in tool technique?
28. Develop accuracy?
29. Help break down the project into its component parts?
30. Aid the student in selecting proper tools?

CHAPTER IV

PRODUCTION OF FILM SLIDES

If the teacher is to make use of the film-slide method of teaching, it is important that he have the film slide made to fit his own particular class organization. If the system is large enough to maintain a department of visual education, this department would be the proper agency to make the film slides if it is properly equipped. The visual instruction department will have experts who can take the pictures for the teacher and then make them up into slides for classroom use. Once they have been made for one teacher, it is an easy matter to duplicate them for other teachers who may be interested in the project.

If the teacher wants the department to make the pictures and slides, he should submit a tenative outline of the pictures to be taken to the supervisor of visual instruction in order that the department might have a better understanding of what is wanted. The writer believes that the visual education department can contribute much help to the teacher in making up his own visual material.

Not all school systems have a department of visual instruction, and the teacher should not feel that the problem of having film slides is beyond his reach. Slides can, and have been produced by teachers, which compare favorably with those of the professional photographer. The

teacher does not have to have a technically perfect slide in order to obtain results. Often times the teacher-made slide will give better results than the professional made slide because the teacher has a better understanding of what is wanted in the slide.

Slides made by Teacher.

With the development of the miniature or candid camera, it is possible for the teacher to make his own film slides at a very reasonable cost. The miniature camera uses a 35 mm motion picture film which contains eighteen or thirty-six exposures per roll. The teacher may with this type of camera make up film slides on a great many related or instructional units for use in the classroom. Although a miniature camera is not essential, the teacher will find that cost per picture will be considerably less.

Equipment.

For the teacher who is interested in the making of film slides, the first consideration should be the purchase of suitable equipment. Cameras using 35 mm film can be purchased at prices ranging from twelve dollars to two-hundred dollars, depending upon the quality of equipment desired. For the teacher who is starting in the production of film slides a low or medium priced camera would be the most practical. In selecting any camera certain things

should be considered, such as:

1. Does it have a wide range of shutter speeds, so that any kind of action can be stopped? The slower speeds are also helpful in taking pictures under poor light conditions.
2. Does it have a good lens of standard make?
3. Does it have a focusing mount so that pictures can be taken at a close range?
4. Does it have interchangeable lenses?
5. Does it have a coupled range finder?
6. Is it a standard make?

The 35 mm camera has many advantages over the large type of cameras. The expense of operating the candid camera is considerably less than operating a larger type camera. Dent says: "The product of the ordinary small camera averages about thirteen cents in cost per picture; that of the miniature camera, about three cents."[1] It is quite evident that, if a teacher is to make very many pictures, the miniature camera will pay for itself in a short period of time. No matter what camera is selected, one should spend considerable time in reading the instructions which come with the camera so that he understands fully how to operate the camera. A good book on miniature photography, such as the Leica Manual,[2] will help the beginner to gain a more thorough understanding of the working and possibili-

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[1] Dent, Ellsworth C. The Audio-visual Handbook. pp. 81-82

[2] Morgan, Willard D. and Lester, Henry M. The Leica Manual.

ties of the miniature camera. Along with the purhcase of the camera there are certain items which should be purchased if the teacher is to get the best results. An exposure meter should always be included. The writer prefers the photo-electric type of meter as it is probably the easiest and most accurate kind for the teacher to use. A purchase of a light meter will pay for itself in a short time in film and time saved. A tripod to support the camera is essential if one is to get clear and sharp pictures. A tripod holds the camera steady and thus does away with many blurred pictures which are sometimes due to movement of the camera when held by hand. Two or three good reflectors on stands are included in the equipment as this will allow for the taking of pictures indoors. Number one or number two photo-floods should be used in these reflectors as they are made especially for taking indoor scenes. A few yards of monks cloth or any other material that is of a neutral color and non-reflecting will serve as a background. A piece of medium gray suede cloth was used as background material for some of the pictures in this study. This rounds out the minimum of equipment needed to start production of film slides. A few miscellaneous items of equipment may be added, although they are not essential to the making of film slides. A cable release, a medium yellow filter, a red filter, and a sunshade are all valuable equipment if the teacher cares to invest in these items.

As to the selection of film, the teacher has a wide variety of choices. Almost any type of film can be purchased for the 35 mm camera. The writer prefers a medium speed film with panchromatic film emulsion for most of his work. Films should be very fine grained so as to produce negatives of fine quality. For the recording of color scenes, color film can be used to advantage and gives a true reproduction of colors without any tinting or painting. Bulk film can be purchased at a great saving, but the teacher must load it onto spools. This should always be done in a dark room.

Photographing.

The teacher should analyze the material very carefully before he starts in the actual process of photographing the material he wants to present in the form of slides to his class. A tenative outline should be made and a notation of all pictures that are to be taken included. If an outline is made which has the pictures to be photographed in sequential order, it will make the taking of the pictures much easier. Each picture to be taken should include a memorandum of materials to be used, where it is to be taken, subjects to be included and time to be taken. In this way much time and material will be saved in making pictures. "The preparation of a shooting script is a simple job if the following questions are borne in mind:

1. What do I want to show?

2. How can this be done in photographs?

3. Specifically what photographs do I need to make a rounded job?

4. Where am I likely to find my subjects?"[3]

The writer has found that it is well to use students in the pictures whenever possible as the use of people with whom the student is unfamiliar will not create as much interest in the pictures. Having as many of the students participate in the making of pictures as is possible adds greatly to the experience on the part of the students who are helping, and it also reduces the amount of work the teacher has to do. Pupils can be of great help in moving lights, background, and in the placing of material to be photographed. In the placing of lights care must be taken that the lights do not shine directly into the camera lens. "In order that you may make your pictures artistic, you must learn how to control and direct the light just where you want it, to produce the desired effect."[4] For general lighting, it is best to allow the light to fall on the subject at an angle of forty-five degrees. The problem of lighting is a very important one in making clear pictures and can be learned only through experience as each situation has its own lighting problems. The writer has found that three reflectors with number two photofloods will handle

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[3] Ibid. p. 324

[4] Eastman Kodak Company. How to Make Good Pictures. p. 118

most of the lighting problems for the majority of indoor pictures.

After the outline of what is to be photographed is completed and the teacher has rehearsed the pupils in the part they are to take, comes the actual problem of photographing. The camera should be checked to see that the film is winding through correctly. The lens should be cleaned with lens tissue, as a cloth or handkerchief tends to scratch the lens. The lights should be turned on and the light value read with the exposure meter. It is a good plan to get close to the subject you are photographing to take the meter reading. If you take the meter reading from the camera position you are liable to get an erroneous reading as the meter also gives the light value for the areas around the subject as well as the subject. If a tripod is being used, it is well to have a student steady it so that no one is likely to knock it over.

When taking pictures it is always a good plan to keep a record of the pictures taken, exposure, meter reading, etc. The following method has proven helpful to the writer:

Picture Number	Comments	Film Used	Lights	Meter Reading	Stop	Shutter
3		Agfa Fino-pan	Three #2 Photo-floods and reflectors	65	F8	20th

By using this method a very complete record is kept of the pictures taken. If any pictures have to be retaken the chart helps to point out just what was wrong so that the same mistake will not reoccur. During the actual photographing of the pictures, it is best not to have any spectators as this usually makes for more confusion and one may not get good pictures under such conditions.

Before taking any picture, a great deal of thought should be given to the arrangement of the subject so that when the pictures are finished, they will show just what is wanted and nothing more. Neblette, Brehm, and Priest (5) say:

> The success of a picture from an artistic standpoint depends largely on how well three things have been chosen: (1) the subject as a whole, (2) the point of view, and (3) the lighting. Choice of these should in turn be governed by a knowledge of the principles of composition.

The writer has found that in photographing subjects for teaching purposes, it is well to consider the three principles of composition: dominance, balance, and harmony. "After all, in pictorial composition there are but a few basic principles that, if remembered, will aid anyone to make attractive pictures. Have but one main or dominating point of interest. Do not try to make a picture tell more

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5 Neblette, C. B. Brehm, F. W. and Priest, E. L. Elementary Photography. pp. 23-24

than one story."[6] This point of having the picture tell only one story is one which should always be kept uppermost in mind in making pictures for the classroom. Often a picture will be confusing because it tells more than one story. Objects of secondary importance should contribute to making the dominant theme more prominent.

If titles are wanted for any of the slides, they may be lettered on white cardboard with India ink and then photographed. There are also available many types of titling letters that may be purchased at nominal cost. The writer prefers a plaster of paris letter about $\frac{3}{4}$ of an inch high which has a pin back. The pin enables one to stick the letters in place on a soft substance, such as fir tex, without fear that they will move when touched in placing the material in place for photographing. Positive film, which is relatively cheap, may be used in taking the titles. As positive film has a rather slow emulsion speed, photoflood lamps with reflectors should be used to illuminate the titles.

Developing and Printing.

For the teacher who has acquired an interest in photography, the developing and printing of pictures may be the most interesting of the whole process of making film

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[6] Eastman Kodak Company. Op. Cit. p. 64

slides. The teacher may, of course, turn his negatives over to a competent commercial finisher and have the work done at a cost varying from five cents to ten cents for each picture. In this way the teacher would only have to rearrange the negatives in the order desired and the finisher would make the slides either in a strip or bound between glass. The glass-bound slides cost more but offer the added advantage that they can easily be rearranged to suit the teacher's needs.

If the teacher does wish to do his own finishing, a minimum list of equipment should include: a developing tank, thermometer, two fine soft sponges, a graduate, fine grain developer, short stop and hypo. In the selection of a tank, it is well to choose one that is easy to load, and is substantial. The thermometer should be one made for photographic work. The choice of the kind of developer is largely an individual matter, but the beginner can obtain good results by using any standard fine grain developer. Most fine grain developers yield very good results if the directions of the manufacturer are followed specifically. When once a developer is decided upon, it should be used exclusively as one becomes familiar with its properties and the results obtained.

Before one attempts loading a film into the reel of the tank, considerable time should be spent in practicing loading the reel in daylight with a piece of blank or used

film until the loading process can be done with the eyes closed. When loading the film into the tank, be sure that it is done in a room which is totally dark. Once the film has been transferred into the tank and the lid replaced the remaining operations can be carried on in a lighted room. After the developer has been slowly poured into the tank, the film should be gently agitated. Agitation prevents developing streaks and air bubbles from forming on the film. It is necessary that the temperature of the developer be taken into consideration. The temperature should be kept as near the temperature recommended by the manufactures of the developer as possible.

After the film has been developed, the developer should be poured off into a bottle and the short stop bath poured in to check the developing action. The short stop bath should remain for at least one minute, after which it is poured off.

Fixation; the final stage for processing films, is as important as the development and its purpose is to dissolve the unexposed portion of silver, thus rendering the film permanent. An efficient hardening fixing bath (hypo) is required for this purpose. Films should be thoroughly fixed for at least ten minutes. After the films have been completely fixed, they should be washed for thirty minutes in cool running water, approximately 65°F. The writer has found that it is not wise to have the wash water below

60°F. as it will not wash the films properly.

When the films have washed thoroughly, they should be removed from the reel with great care so as not to scratch the emulsion. The film should be hung to dry in a room free from dust. Spring clothes pins make very efficient and inexpensive clips. To prevent curling, a clip should be used on the lower end of the film. The excess water on the film should be carefully wiped off with absorbent cotton or fine sponges. The film should not be touched during the drying process, which usually takes about three hours. The Leica Manual (7) gives the following general suggestions for developing procedures:

1. Utmost cleanliness should be observed throughout processing of negatives.
2. Use only the best and purest chemicals, and once a brand is adopted continue to use it for uniform results.
3. Never permit fingers to come in contact with emulsion side of film either before or after developing.
4. Never handle film except by its edges.
5. If film becomes soiled, wipe it carefully with a soft chamois skin dipped in a suitable film cleaner.
6. Films should be kept as far away as possible from heat, radiators, hot water pipes, etc. It should be remembered that most of our negative material is nitrate stock and highly inflammable. Therefore

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7 Morgan, Willard D. and Lester, Henry M. Op. Cit. pp. 152-153

films should be kept in a well ventilated cool dark place, away from open flame.

When the negatives are thoroughly dry, they are ready to be used in the making of film slides. The teacher may take them to the commercial finisher who will make film slides from them at a very reasonable cost. The cost will vary from five to ten cents per picture. If they are taken to the commercial finisher the sequence that the pictures are to follow should be clearly indicated, either by number, if the film has numbers on the edges, or by some other means that will enable the finisher to put the pictures in proper sequence. If titles are to be included in the finished film, be sure to indicate where they belong. If one will take time to follow these few precautionary steps a great deal of time and money will be saved.

If the teacher cares to make his own film slides, this may be done with some degree of success, but the writer does not recommend the making of film slides from the negatives until the teacher becomes more skilled in the techniques of photography. In the making of a film slide from a negative, a picture is taken of the negative on positive film, thus producing a positive print for projection. The film used for the making of the positive has a very narrow range of latitude, and for this reason it is very difficult for the beginner to obtain good prints

for projection. However, if the teacher is interested in making his own positives, he will find a very complete discussion on the making of slides from 35 mm negatives in the Leica Manual,* chapter twelve.

Projection.

Most cameras that use 35 mm film produce a negative of about the proportion of 1 inch by 1½ inch. This size negative is called in the trade, the double frame size. Many of the schools have lantern slide projectors that use a large glass slide. This projector can be adapted to take a single frame slide which is about ¾ by 1 inch. In order that the teacher can use this adapter, he should make it clear to the finisher that the slides will have to be of the single frame size. Although very satisfactory results may be obtained, by using the large projectors, the writer prefers to use one of the newer projectors which are made especially for the double or single frame slide. These projectors range in price from about thirty-five dollars to sixty dollars. They have the added advantage of being small and therefore taking up very little room in the classroom.

Many teachers do not use slides in the classroom, because the room can not be darkened. The writer has found

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*Ibid. pp. 257-272

that a darkened room is only necessary when the projected image is to be of large proportions. If the projected image is not to be larger than two by three feet, very satisfactory results can be obtained in a room that is not fully darkened. For individual use, the picture can be much smaller. The screen used for projecting the picture does not have to be an elaborate one. A window shade that has been mounted on a base and then given two coats of aluminum paint makes a very satisfactory screen. If a screen is to be purchased for the classroom, it is well to buy a beaded screen on a collapsible stand.

At the beginning of each term, it is well to devote a period to instructing the pupils in the operation of the film slide projector. Once the student understands the use of the slide projector, the problem of the use of the slide projector will be solved for the remainder of the year. In the instructing of the pupils in the use of the slide projector, it is well to impress the importance of seeing that:

1. the lens and condensors are clean,
2. the sprockets fit into the perforations in the film,
3. the film is upside down in the projector with the glossy side towards the screen,
4. the film is handled by the edges so as to keep finger prints off the film,
5. the student disconnects the projector when he is through using it.

If the teacher takes the time to instruct the pupils properly in the use of the slide projector, no great difficulty should be encountered in its use by the pupils.

CHAPTER V

SUMMARY

The emphasis in education today seems to be on the matter of developing the individual's potentialities to the utmost and, at the same time to develop the type of individual that will fit into our complex modern society. This kind of education stresses the point of view that each individual should develop himself so that he will be both a benefit to himself and to the community in which he lives. If the development of the pupil is to be fully achieved, the teacher must recognize that pupils differ in abilities, interests, and capacities. If the teacher accepts this philosophy of individual differences, he can no longer teach all the pupils in exactly the same manner. He must try to consider each pupil as an individual who has certain abilities to be developed.

This study has presented a method of instruction through the use of film slides, which will in some degree make allowances for individual differences in the industrial arts shop. The method consists of a series of film slides of the projects used in the industrial arts shop. The film slides are made of those projects which seem to be most consistently selected by the pupils from term to term. The writer is of the opinion that twenty to thirty film slides would be sufficient to handle most of the projects

in the junior high school shop. Any projects developed by the pupil could be handled by some other method. Only three projects were used in this study, as it was felt that three would be sufficient to present the method.

An analysis of each project was made in order to determine what pictures would be best. It was not the purpose of the analysis to break the project down into its smallest details, but rather to present enough of the project, so that the pupil would have an understanding of what was required to complete the project. The analysis forms were sent out to experts in the field of industrial arts, who were to check the forms. They were to add, revise, or omit any steps in the analysis. When the blanks were returned, a final set of analysis forms were made taking into consideration any suggestion offered by the experts. These final forms were used as guides in making the pictures for the film slides.

The film slides were used by the writer in the shop in several ways:

1. For the presentation of projects
2. For class demonstration
3. For individual instruction
4. For review

The writer found that the film slides were most valuable in the presentation of projects to the class at the beginning of the term. Although the number of film slides

were limited, those used did save the teacher a great deal of time in presenting visually to the students of some of the projects that they might make during the term.

The film slides were not used for group demonstration unless the group selecting a particular project was so large that it seemed best to handle it by the group method. The film slides were used mostly by pupils for the purpose of self instruction. The pupil selecting a project for which there were film slides available, was allowed to use the slides whenever he saw the need for them. Many pupils needed to see the pictures only once while others had to review the film for each step in the procedure.

This method of instruction was received very favorably by the pupils, and many of them expressed a desire for more film slides. The fast students seemed to approve of the method, because they were not held back by having to wait for the slow students to catch up before they could go on to the next step.

The rating scale was used in the evaluation of the method. The scale tried to encompass those things which the writer thought ought to distinguish a method as a good one. The scale was then sent out to experts in the field of education, who were to rate the questions on a five-point basis. The raters were people who were known for

their interest in the field of education. All of the raters had a great deal of experience in their particular field. The raters were chosen from as many different phases of the school organization as seemed advisable. In the opinion of the raters, the method of teaching with film slides has its greatest value in helping the teacher present a variety of projects to the class at the same time, in review, and in helping the student visualize the project. All of the raters seemed to express the idea that this method would be of great help in the classroom.

The study also presented a brief discussion of the steps involved in the making of film slides. A detailed explanation was not attempted, because it was felt that one could find many books on the techniques of photography which gives a more complete discussion of the subject than could have been given in this study. The material presented in the chapter on the making of film slides is intended to give the reader some of the fundamental aspects of the processes of making film slides. The writer realizes that the subject of photography is a rather technical one, but with little study a teacher can make film slides that will help him make his work more interesting to his classes.

In conclusion the writer would like to sum up the values of this method as follows:

1. It aids the teacher in reviewing steps in a project.

2. It gives the teacher time for individual instruction.

3. It puts more responsibility on the pupil for planning his own work.

4. It helps the student see the steps involved in a project before he attempts the project.

5. It helps the teacher present a large variety of projects at the same time.

6. It allows for individual differences.

7. It saves teacher time in redemonstration.

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APPENDIX

4519 N. E. 36th Ave.
Portland, Oregon

Dear Sir:

One of the trends in industrial arts in the junior high school seems to be in the direction of a more diversified program in which individual interests, capacities, and abilities are taken into account. In the shop, where a variety of activities are going on at the same time, the teacher finds it difficult to give instruction and demonstrations to so many small groups.

It is the purpose of this study to present a method by which the instructor may teach a variety of activities and yet have enough time to give individual instruction where it is most needed.

In brief, the method would consist of a series of film slides showing the steps or operations involved in a project. The student would refer to this film, and from it receive enough information to start him on his job.

Attached to this letter are three analysis sheets of projects to be filmed. It is not the purpose of the analysis to break the job down into its smallest details, but rather to present enough of the job so that the student will have some understanding of the project and then proceed to work out the smaller details for himself.

Column one shows the writer's order of the steps. In column two you are to put the numbers of the steps in the order which you think is proper. In column three add or eliminate steps which you think should be added or eliminated. Number the added steps to show where they should fit into the analysis.

Yours truly,

Amo DeBernardis

Approved:

STEPS IN MAKING A SMALL BOX

	Writer's Order	Revised Order	Steps to be Added or Eliminated
Make drawing	1		
Select material	2		
Cut material	3		
Plane face	4		
Check face	5		
Plane edge	6		
Check edge	7		
Square end	8		
Measure to length	9		
Cut to length	10		
Plane end	11		
Gauge to width	12		
Plane to gauge line	13		
Gauge to thickness	14		
Plane to gauge line	15		
Select nails	16		
Start nails	17		
Apply glue to joint	18		
Drive nails	19		
Measure for bottom	20		
Cut bottom	21		
Nail on bottom	22		

	Writer's Order	Revised Order	Steps to be Added or Eliminated
Set nails	23		
Putty nail holes	24		
Sandpaper box	25		
Shellac box	26		

STEPS IN MAKING A TIN BOAT

	Writer's Order	Revised Order	Steps to be Added or Eliminated
Trace pattern for hull	1		
Cut out hull	2		
Bend hull to shape	3		
Solder center seam	4		
Solder chine	5		
Solder stem	6		
Solder stern	7		
Solder center section	8		
Lay out deck	9		
Cut deck	10		
Cut deck stiffeners	11		
Bend flange on deck stiffeners	12		
Solder stiffeners in place	13		
Fit keel	14		
Solder keel	15		
Drill hole for rudder tube	16		
Solder rudder tube	17		
Solder rudder	18		
Solder bow sprit	19		
Plane mast	20		
Plane boom	21		

	Writer's Order	Revised Order	Steps to be Added or Eliminated
Set up temporary rigging	22		
Make pattern for sails	23		
Cut sails	24		
Sew sails	25		
Set up permanent rigging	26		

STEPS IN MAKING A LEATHER COIN PURSE

	Writer's Order	Revised Order	Steps to be Added or Eliminated
Cut out pattern	1		
Trace pattern on leather	2		
Dampen leather	3		
Fasten pattern to leather	4		
Trace design on leather	5		
Tool design	6		
Skive edges	7		
Punch holes for snap	8		
Set snap	9		
Apply cement	10		
Crease edge	11		
Lay out stitches	12		
Punch holes for stitches	13		
Sew purse	14		
Clean leather	15		
Apply dye	16		
Apply wax	17		
Polish	18		

4519 N. E. 36th Avenue
Portland, Oregon

Dear Sir:

Attached to these rating sheets are a series of pictures showing the procedures in making certain projects in the industrial arts shop. These pictures are to be made into slide form and to be used by the individual student for self-instruction or by the teacher for group demonstration. The captions beneath the pictures will be the titles preceding the pictures on the film slides. It is not the purpose of this method to present these jobs in minute detail, but rather to present the important procedures so that the student will have some idea of the project he is to make.

After you have studied the pictures, read over the rating scale and rate each individual question by placing an X on the horizontal line at the point which you think is appropriate. If you have any comment or questions please write them in the margin or on the back. All comments and criticisms will be appreciated.

The writer would appreciate having the pictures and questions returned at your earliest convience.

Yours truly,

Amo DeBernardis

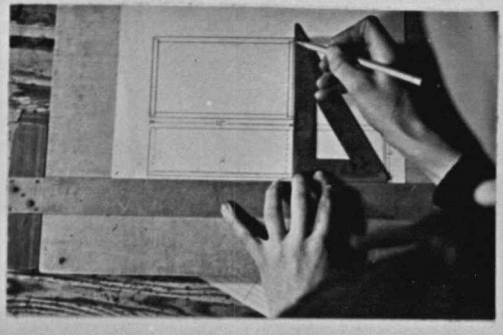
To what extent should this method:

	Small 1	2	3	4	Great 5
1. Aid the teacher in demonstration?					
2. Aid in review?					
3. Make the pupil think for himself?					
4. Develop initiative?					
5. Stimulate desire to read for further knowledge?					
6. Motivate the student?					
7. Help the poor reader?					
8. Improve self-discipline?					
9. Inspire the pupil to do his best work?					
10. Allow for the range in the pupil's abilities?					
11. Give the teacher time for individual instruction?					
12. Develop in the pupil the habit of orderly method of procedure?					
13. Develop confidence in the pupil in approaching a problem?					
14. Develop ability to follow instructions?					
15. Make the pupil stick to the task until it is finished?					

To what extent should this method:

	Small 1	2	3	4	Great 5
16. Hold the pupil's interest?					
17. Help the student to approach the project?					
18. Help the student visualize the project as a whole?					
19. Give the student an idea of the amount of work involved?					
20. Stimulate interest in the project?					
21. Develop cooperation?					
22. Replace instruction sheets?					
23. Prevent wasting material?					
24. Develop proper use of tools?					
25. Aid the teacher in presenting a variety of projects at the same time?					
26. Promote class and group discussion?					
27. Point out to the student his deficiencies in tool technique?					
28. Develop accuracy?					
29. Help break down the project into its component parts?					
30. Aid the student in selecting proper tools?					

Steps In Making A Box



1. Make Drawing

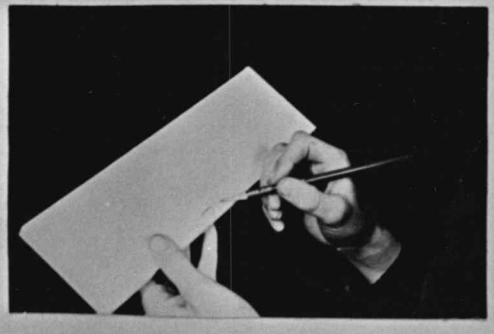
2. Make Bill Of Material

3. Select Material

4. Cut Material To Rough Size

5. Plane Face

6. Check Face

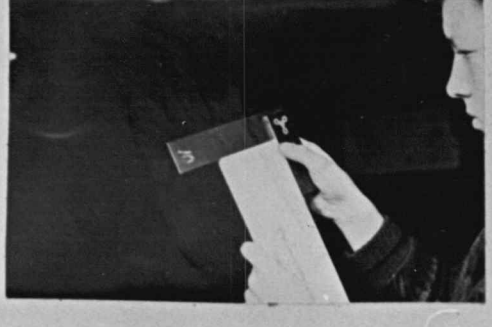


7. MARK FACE

8. PLANE EDGE

9. CHECK EDGE

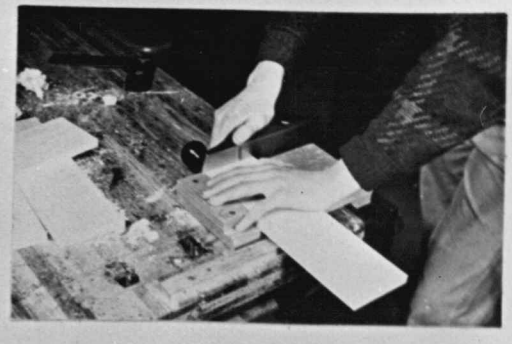
10. SQUARE END



11. CHECK END

12. MEASURE TO LENGTH

13. CUT TO LENGTH



14. PLANE END

15. CHECK END

16. GAUGE TO WIDTH

17. PLANE TO GAUGE LINE

18. GAUGE TO THICKNESS

19. PLANE TO GAUGE LINE

20. SANDPAPER PARTS OF BOX

21. SELECT NAILS

22. START NAILS

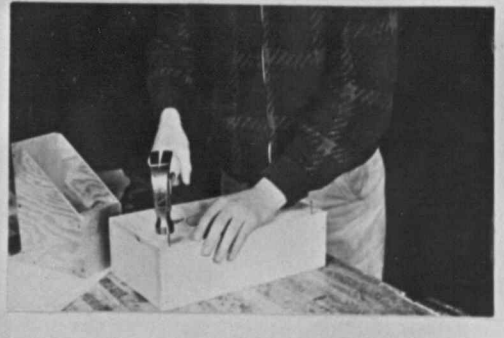
23. APPLY GLUE TO JOINT

24. DRIVE NAILS

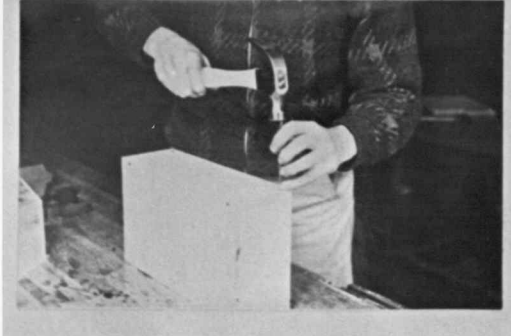
25. MEASURE FOR BOTTOM

26. CUT BOTTOM

27. SQUARE BOX



28. NAIL ON BOTTOM



29. SET NAILS

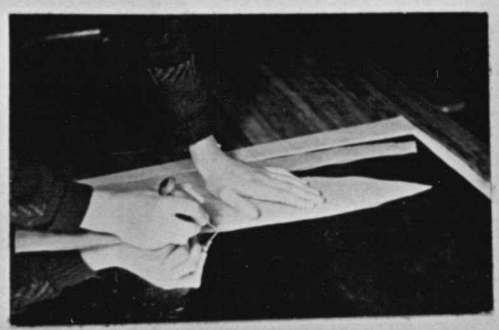
30. PUTTY NAIL HOLES

31. SHELLAC BOX

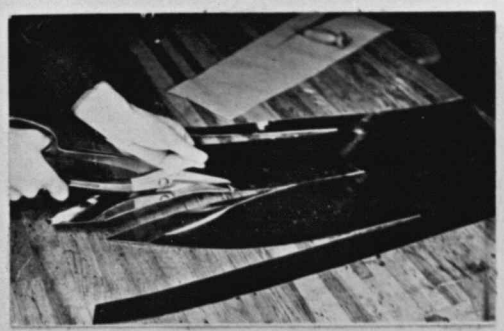
32. AFTER FIRST COAT IS DRY, STEEL WOOL AND APPLY SECOND COAT

33. HAVE BOX CHECKED BY INSTRUCTOR

Steps In Making A Tin Boat

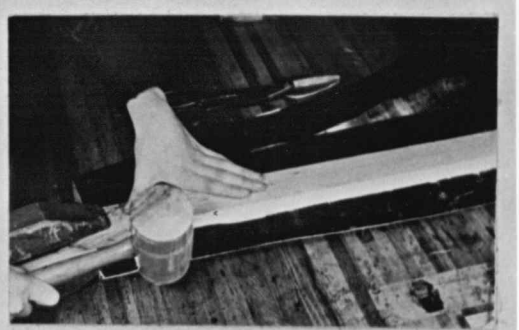


1. Trace Pattern For Hull



2. Cut Out Hull

3. File Hull



4. Bend Hull To Shape

5. Solder Center Seam

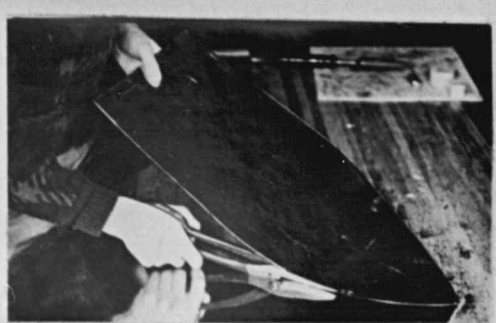
6. Solder Chine

7. Lay Out Center Section And Stern

8. Solder Center Section

9. Solder Stern

10. Lay Out Deck

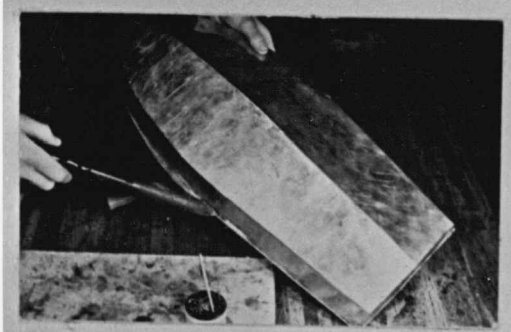


11. Cut Deck

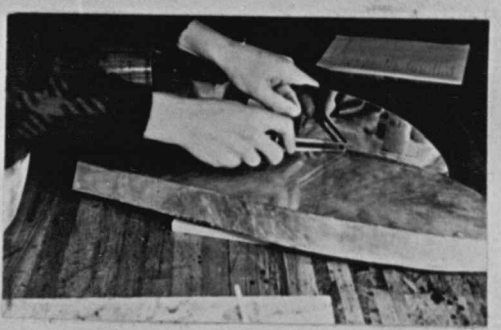
12. Cut Deck Stiffeners

13. Bend Flange On Deck Stiffeners

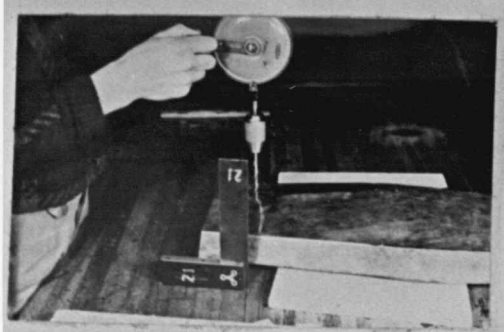
14. Solder Stiffeners In Place



15. Solder Deck



16. Fit Keel

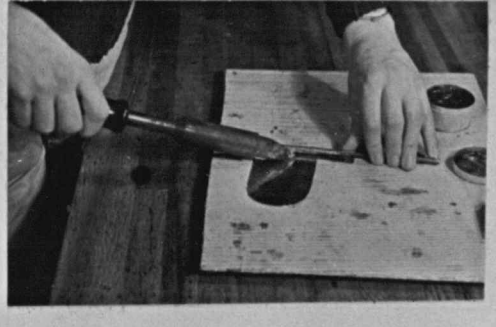


17. Drill Hole For Rudder Tube

18. Solder Keel

19. SOLDER RUDDER TUBE

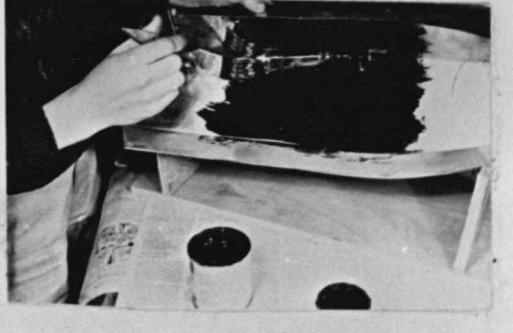
20. CUT OUT RUDDER



21. SOLDER RUDDER

22. CUT OUT BOWSPRIT

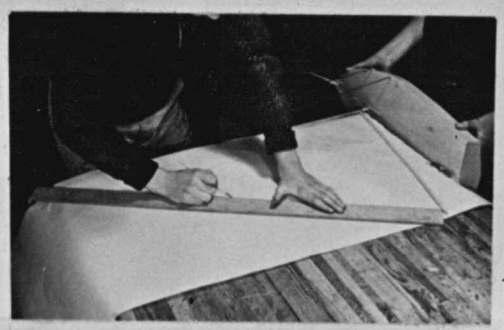
23. SOLDER BOWSPRIT



24. PAINT HULL

25. PLANE MAST AND BOOM

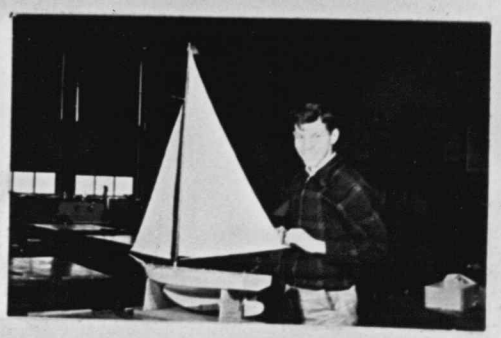
26. SET UP TEMPORARY RIGGING



27. MAKE PATTERN FOR SAILS

28. CUT SAILS

29. SEW SAILS



30. SET UP PERMANENT RIGGING