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Scope of Study: This study was made because the writer recognized the need for the use of more visual aids in the school shop safety program. The writer mailed ninety-four questionnaire cards; fifty-two were returned. The replies on the cards indicated the lack of the use of many of the visual aids which could add much to the shop safety program. The study also includes a brief history of education and industrial arts, the development of visual aids and the description and application of various visual aids to the shop safety program.

Conclusions and Recommendations: A visually aided program is more effective than a completely verbal one. Approximately eighty-five per cent of the total knowledge gained by students is acquired through the sense of sight. The shop instructor should enrich the safety program by the use of visual aids. The media should be chosen that will most effectively meet the safety problem. The application of the visual aid must be understood. Future application toward the solution of the shop safety problems will be increased if the students help prepare or present the visual aids.

ADVISER'S APPROVAL L. H. Bengtson

# THE USE OF VISUAL AIDS IN TEACHING SHOP SAFETY

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A Report

by

HARRY E. SHINN

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Oklahoma Agricultural and

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H. E. S.

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# CHAPTER I

## THE PHASES OF STUDY

There is a definite increase in the realized value of the visual aid. The use of the visual aid has been accelerated during the period since World War II. There remains much to be accomplished in the field of educating shop instructors in the types and applications of the many visual aids.

There are a number of visual aids that are not often considered when the term visual aid is mentioned. These aids can be very effective when applied in a creative manner. The visual aid need not be of the most expensive type to convey an impression.

The purpose of this report is to present an assortment of visual aids and their use in teaching shop safety. It is the writer's aim that through this report more teachers will realize the value of visual aid. It should assist them in the selection of a teaching medium and emphasize the contributions it may make toward more and better safety mindedness.

Description of the Problem. The general observation of lack of the use of visual aids in shop classes during the author's practice teaching and the results of a survey

conducted by the writer showed a definite lack of the use of many available visual aids. The knowledge acquired in two visual aids courses and a desire to help others in selecting visual aids to teach shop safety led to the selection of this problem.

In order to make a complete report many steps of research were necessary. In dealing with the problem the writer has attempted to secure all available information on the present day visual aids. The selection and grouping of the visual aids is not in order according to their importance.

Need for the Study. The methods of teaching used in this modern age should include every possible device available to impart information to our youth. It should be the desire of each shop instructor to provide the best and most effective means of presenting the important problem of shop safety.

The use of visual aids as used in the teaching of Industrial Arts subjects has been covered quite extensively. There are several writings on prescribed methods of teaching shop safety, some of which suggest the use of a few of the many visual aids.

At the present time there are a great number of visual aids that could be used as teaching aids. A list of the visual aids and their application to the specific subject of teaching shop safety will be presented in this report.

Limitations of the Study. There are numerous visual aids available to the shop instructor, many of which could be useful tools in the teaching of shop safety. Because of the number of visual aids to be described it is necessary to place limitations on the scope of this report. This report is not intended to be a complete course in the teaching of shop safety. It will not provide a rigid schedule for safety organization. There are several studies that give lists of films, slides, and other materials, which make it unnecessary to repeat all of that information.

Review of Similar Studies. A review of similar studies in the field of visual aids as used in teaching was necessary in preparing this report. There are several points of special interest presented in these studies, (1) the purpose for which these studies were made, (2) to discover material that may be correlated with safety, (3) the extent to which the studies covered the wide selection of visual aids.

The Scott Thesis. Gordon E. Scott completed his master's thesis in 1943 entitled The Use of Lantern Slides, Silent Slide Film, and Sound Slide Films in Teaching Industrial Arts.

The chief purpose in making this study was to show the importance and use of slides, film strips, and sound films in teaching industrial arts. There was a complete list of

slides, film strips, and sound film strips desirable for the different industrial arts classes along with the addresses of the different companies furnishing them.

The Gunderson Thesis. Sigurd L. Gunderson completed his master's thesis in 1939 entitled A Study of Visual Aids and Their Use in Teaching Industrial Education in the Secondary School.

The main purpose of this study was to provide a summary of the values and limitations of visual aids in the secondary school and to compile lists and sources of available material.

Method of Research. In order to better understand the present use of visual aids in the teaching of shop safety the writer sent out ninety-four information cards to various industrial arts instructors in Oklahoma. It is the writer's belief that the number of cards and the locations to which they were sent gives an average representation of most of the industrial instructors of Oklahoma.

The writer did not choose to implicate or reflect in any way the strengths or weaknesses of any one instructor's safety program; therefore, the cards were not signed by the respondents.

The results of this questionnaire shows that there is a limited variety of visual aids in use. This fact substantiated the writer's realization of the need for this study.

The following table shows the results of the questionnaire. Out of ninety-four information cards sent out fifty-two were returned with the necessary information.

TABLE I

QUESTIONNAIRE RESULTS

| TYPE OF VISUAL AID | INSTRUCTOR USING METHOD |
|---|---|
| Posters | 39 |
| Safety Films | 25 |
| Lecture and Demonstration | 23 |
| Film Strips | 13 |
| Prepared Slides | 3 |
| Committee on Safety | 1 |
| Safety Slogans | 1 |
| Photographs | 1 |
| Painting Danger Zone | 1 |
| Supervision | 1 |
| Cutaways | 1 |

The library resource method was used to provide the basis for the material used to describe the different visual aids. An extensive investigation was made of all the available literature in the Oklahoma A. & M. College Library.

# CHAPTER II

## THE HISTORY AND PHILOSOPHY OF INDUSTRIAL ARTS

The history of today's industrial arts goes back to the smallest threads of records in the sixteenth and seventeenth centuries. The purpose of this chapter is to begin with those mere threads of history and show how they were added to and made stronger to form the hawserlike strength of today's industrial arts.

### Part A. Early European History

In Germany during the sixteenth century there were two fundamental ideas adopted upon which modern instruction in manual arts has been built. The first is: sense impressions are the bases of thought and consequently of knowledge. The second is related to the idea of learning by doing.

The object method of teaching and also the laboratory method soon developed from the first ideas. The value of making something with hand tools in a skillful manner developed from the second idea. Some of the first men of Europe to give guidance in the hand crafts were Francke, Rousseau, Pestalozzi, Fellenburg, and Froebel.

The Francke Institute. In 1694 August Hermann Francke organized a religious school for the poor children. But in

addition to his religious instruction he gave instruction in several of the manual arts. A teacher who studied under Francke, Johann Julius Hecker, went to Berlin Germany in 1747. He established the first non-classical school in Germany.

Rousseau's Philosophy. Jean Jacques Rousseau firmly believed that experience is the best teacher and he would therefore have everything possible taught by action and say only what we cannot do. Rousseau's recognition of the fact that the manual arts may be a means of mental training marked the beginning of a new era in education. Rousseau's beliefs were followed closely by Pestalozzi.

The Work of Pestalozzi. John Henry Pestalozzi has been called the "father of manual training". Pestalozzi had read of the works of Rousseau and believed in his educational views. He had an intense desire to improve the conditions of the poor children of Switzerland. His success in the use of objects as a means of teaching the traditional school subjects was realized.

Pestalozzi said: "Either we go from words to things or from things to words. Mine is the second method". (2, page 119)

Fellenberg's Institution. Phillip Emanual von Fellenberg founded his institution in Hofwyl, Switzerland in 1799. Some of the teachings of Pestalozzi were followed by Fellenberg and

the institution influenced the manual arts more than any other educational movement of the early nineteenth century.

Some of the schools of the institution were the Academy Farm and Trade School, and School of Applied Sciences. The Farm and Trade School took care of poor boys. These boys were taught farm work until they were old enough to select a trade. When the boys reached twenty-one, they left school with a trade and education beyond their class.

Froebel's Ideals of Self-Activity. Friedrich Wilhelm Augustus Froebel fully accepted and developed Pestalozzi's idea of organic growth and developed it into the doctrine of self-activity which he made the very center of his educational theory.

The high place of handwork in Froebel's scheme of education is indicated in the following quotations from The Education of Man. "The young, growing human being should, therefore, be trained early for outer work, for creative and productive activity". (2, page 210)

Art Education in Relation to Industry. The progress of industrial arts education as a part of the public education would not be complete without the consideration of art and technical drawing in connection with geometric and natural forms in connection with industry.

Early art academies in Italy were privately operated by guilds which had religious motives. One of the academies

was formed as early as 400 B.C. and was very popular and well known. An academy of later times was that of Francesco Squarcione a Padua in the early half of the fifteenth century.

Italy became a nation of fine workmanship and refined tastes of art. Italy was known as the mother country of the fine arts of the western countries and of many industrial arts also.

A main event in the seventeenth century was the forming of the French Academy of Painting and Sculpture in 1648. The government assumed the responsibility for the promotion of art and in time it made Paris known as the art center of the world. During the early centuries in England it was impossible to obtain instruction in art while in France there were about eighty schools of art and design.

The realization came to Britain in 1851 when a world's fair was held in London which proved that French design in manufactured goods was far superior to those of Britain. The real value of the comparison of goods was the stimulation for the need of art and industrial education in Britain. In 1852 a government art school was formed and called the Department of Practical Art. From 1850 to 1863 the number of provincial art schools had increased to ninety-one.

Development in Germany. In Germany there was development of art instruction as early as the thirteenth century, while the first academy was founded in 1662. In 1780 a school of design for the improvement of manufacturers was

formed. The school was to teach those employed in factories the principles of ornamental design.

Development in America. Early development of art instruction and industrial arts in higher schools came from England to Massachusetts in 1872. During colonial times there was little need for applied art outside of the home. As in other countries the increase in industry and development in America brought out the appreciation for art design. The need for drawing and design training was evident. In 1868 drawing was a required subject and has since played a great role in our educational program.

## Part B. Manual Training in the United States

Manual training in the United States was influenced, to a great extent, by the European developments, particularly by the Russian system and the sloyd system.

Experimentation in Hand Training. The Russian system of the use of hand tools was started in this country as a solution to the need of our own future engineers for training in the use of hand tools and machinery. It was considered to be a part of a well-rounded general education.

It was found that the Russian system would not survive because of the lack of interesting products and achievements. It lacked interest for the students and in many instances was soon abandoned. As the Russian system was rapidly

failing the sloyd system was introduced and it seemed to lack the defects that were found in the Russian system.

The origin of the sloyd system was in the northern countries of Europe among the peasant class of farmers that spent long winter evenings making artistic and useful things for the home. The Finnish reformer, Cygnaeus, was the originator of the earliest manual training in the school. Even at this early date in the development of manual arts in the school, the subject of handwork was being taught much in the same manner as it was practiced in the home. It was then realized that the student must create ideas of his own.

Later development and improvement in the sloyd system was brought about by Otto Salomon who had learned the views of Cygnaeus. Even though the sloyd system was approved as a whole and was being widespread Salomon sought to improve it, emphasizing the cultural functions and adapting the work into stages to be graded. The sloyd system was the first to recognize world wide acclaim. Books have been written in many languages to describe the system to the different countries.

Development of Vocational Industrial Education. The advocates at the end of the nineteenth century were for the use of the manual arts as a part of the liberal arts with considerations for vocational training secondary.

The first decade of the twentieth century brought about a reversal of these ideas. As the schools adopted the sloyd and Russion systems in their "New Education" for the purpose of cultural development, there soon became a demand for greater attention to meeting vocational needs with the manual arts.

Practically all movements for the introduction of hand training into school education have found support in the belief that such training contributes to the vocational preparation of those who are to enter industrial pursuits.

The most important move toward the realization of vocational education was the Massachusetts Commission on Industrial and Technical Education appointed in 1905 to investigate the needs for education. The changes in the methods in manufacturing and the decay of apprenticeship increasing commercial competition played a part in the need for vocation.

Another influential factor in promoting vocational school education in the industries has been the National Society for the Promotion of Industrial Education organized in 1906 to unite the many forces making progress toward industrial education the country over,

By Industrial Education, it is meant that schooling which deals withtraining to direct vocational value to the industrial works. The first object of the society as mentioned in its constitution is, "to bring to public attention

the importance of industrial education as a factor in the industrial development of the U.S."

Further Developments of School Education in the Industries. One of the leading writers on educational theory is John Dewey who said:

> The Industrial Revolution, by shifting the field of manufacturing activity from the home to the factory, makes it incumbent on the school to provide that play for the creative impulses which the home can no longer supply. Furthermore, the school must now afford that knowledge of the industrial world, and, in particular of the fundamental processes which the child formerly could and did acquire through direct observation in the home and in the vicinity. (1, page 220)

One of the most influential systems of industrial education was the organization of the Elementary School of the University of Chicago by John Dewey and Associates during the last quarter of the nineteenth century. The change in manual training from a series of useless exercises with hand tools, to the construction, and useful skill of the industrial occupations, has come to be a noted feature of the vocational trend in industrial education.

Early American Schools of Applied Science and Engineering. An urge for education came to America as a result of Great Britain's success, and because of the need for engineers.

The first institution was Gardiner Lyceum in Gardiner, Maine, 1823. In a degree it was a manual labor school. The shop paid for itself through its own production. The school was a full-time scientific and technical school of college level.

The basic principles of the school were to give instruction to those in branches which are most intimately connected with the arts, and to teach them the foundation of the arts.

Funds for support for the Gardiner Lyceum came from gifts, tuition fees, and appropriations made by state legislature. In about ten years the legislature withdraw its support and the doors of Gardiner were closed. It had pointed out a practical way for education and was a stepping-stone for what is known as an American education of a college grade.

The second and most important school to give instruction in the application of science to the common purpose of life was the Rensselaer School of Troy, New York, which today is the Rensselaer Polytechnic Institute. The school grew out of the need of new development in the country.

Van Rensselaer and an associate, Mr. Amos Eaton, were oppossed to the idea of manual labor in the school subjects but they did not believe in teaching by applying principles. Rensselaer has been regarded as the first graduate school in America.

The Land Grant Act. The education for the improvement in agriculture was evident in early 1785 when visions of improved agriculture were experienced by educated men while working on the farm or perhaps in the classroom. The first agricultural society in America was the Philadelphia Society for Promoting Agriculture organized in 1785. This was followed by the New York Society and the Massachusetts Society.

By the constant effort of Jonathan B. Turner and the skill of Justin S. Morrill under the approving seal of President Abraham Lincoln a very important piece of educational legislation was brought about, known as the Land Grant Act. Out of later ammendments and additions have grown the agricultural colleges of today.

The New Needs. After the War of 1812 there was a great need for engineers to build bridges, docks, railroads, and many other improvements. The mechanical engineering courses grew out of the development of manufacturing and machinery. The combination of scientific reasoning and shop experience was needed.

History can serve two purposes, one is to give knowledge and the second is to inspire others. The industrial arts today owes a great deal to the historical founders who realized the value of hand skills and developed processes that correlated with the general education. The philosophies of some of the first leaders are recognized in some of the modern day philosophies of industrial arts.

## Part C. Modern Philosophies of Industrial Arts

European educators struggled a long time to strengthen their philosophies which have been the stepping-stones of today's philosophies. The needs of today's changing society have made it imperative that the industrial arts become an important part of a general education.

Objectives in Industrial Arts. Each person must have his own objectives of industrial arts if they are to be defended. It is essential that a direct relationship be recognized between the objectives of industrial arts and those of a general education. This is a list of those given by Gordon O. Wilber:

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

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

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

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

5. To provide information about and insofar as possible experience in the basic processes of main industries, in order that students may be more competent to choose a future vocation.

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

7. To develop desirable social relationship, such as tact, cooperation, tolerance, leadership and fellowship.

8. To develop a certain amount of skill in a number of basic industrial processes. (7, pages 42, 43)

Evaluation of Objectives. The specific aims for the industrial arts have a direct relationship with those of

general education. It is necessary that these objectives be understood according to their usefulness in the industrial arts program.

The Use of Industrial Arts Objectives. Objectives should not be formulated only to be set aside and not used. To use the objectives one must evaluate them in terms of expected results. A general idea of what the objective means is not enough. Wilber said: "Specific outcomes are the only measurable results of any type of instruction and should be the immediate goal." (7, page 45)

Behavior Changes. Too often desirable behavior changes are not considered when instruction is planned. The instructor should ask himself, "What behavior changes should I expect from the student?" The use of the objectives in promoting behavior changes markes the instruction as being very well prepared.

Typical Behavior Changes. Each individual should formulate the desirable behavior changes to be attained in a particular teaching situation. A list of behavior changes could be formulated from the group given by Gordon O. Wilber which includes some basic and common elements.

Students will respond to the expected outcomes as individuals so this must be taken into the instructor's consideration

Further Objectives for Industrial Arts. The Policies Bulletin Committee of the American Vocational Association

composed of some of the leading men in the field of industrial arts in Oklahoma formulated the following list of objectives for the industrial arts. They are as follows:

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

2. Develops an appreciation of applied knowledge and skills.

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

4. Contributes to later vocational efficiency.

5. Stimulates student's knowledge and appreciation for good design.

6. Instills a satisfaction in personal creative achievement.

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

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

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

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

11. Develop avocational interests.

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

13. Stimulates correct attitudes in working habits.

14. Aids in making vocational choices.

15. Develops cooperative attitudes in working habits.

16. Develops qualities of leadership.

17. Develops an appreciation of the dignity and importance of the occupation of one's neighbor. (5, page 3)

Robert A. Harden, a present day leader in the industrial arts world submits a simple, but meaningful philosophy for industrial arts: "We have always had a basic philosophy of industrial arts. It is and always has been the welfare of the common man". (4, page 179)

The industrial arts is an important part of the school system. In the industrial arts shop the boy has the opportunity to greatly improve his ability. The teacher of the industrial arts, keeping ever mindful of the strong history and philosophies of industrial arts, has the opportunity to inspire the boy and give him meaningful guidance.

# CHAPTER III

## DEVELOPMENTS OF VISUAL AIDS

Visual education is not new. Early cave men chipped pictures on the walls of their caves to tell of the various animals they saw and of the messages that they wanted to convey to each other. There are evidences of these visual messages in preservation at this very time. Man has always gained knowledge more rapidly and has been able to retain it longer when it was received in a visual form.

Photography. Photography was invented in the nineteenth century in England by Nicpce and Daguerre. In 1892 Wedgewood published in the Journal of the Royal Institute an account of a method of copying paintings upon glass; making profiles by the reflection of light upon nitrate of silver. The process was explained and the article stated that white paper leather, moistened with a solution of nitrate of silver, undergoes no change when kept in a dark place, but being exposed to the daylight, it speedily changes color and after passing through various shades of grey and brown, becomes nearly black. The development of photography soon made it possible to use illustrations in textbooks.

The Camera. In the early 1500's Leonardo da Vinci described and pictured a camera obscura in an unpublished

manuscript. In 1550 J. Cardan suggested the use of a speculum or concave mirror in front of the instrument which produced a reversed image. E. Danti, 1873, corrected the reversed image by means of a mirror behind the lens.

Giovanni Battista della Porta was the first to introduce the use of the convex lens in the camera about 1589. I. Zahn described a portable camera obscura with two or three lenses about 1665. This was supposed to secure greater brilliancy of the image and provide side wings to shield it from extraneous light. At the beginning of the 18th century the portable camera came into regular use as a means of obtaining pictures of commercial value and of taking pictures of natural scenes.

The first roll-film camera was put on the market in 1889 by George Eastman. The interconnection of the shutter and the mirror in cameras was not devised until 1884 when Calvin Rae Smith of New York patented the first practical reflex camera. The Kodak Company introduced the first roll-film camera in 1859 which used daylight loading film that had been announced in 1891. The Brownie box camera came out in 1900.

The Stereoscope. Euclid, about 300 B.C. was first to state that the images of an object seen by each eye are slightly different. Sir Charles Wheatstone, during his investigation on binocular vision from 1832 to 1838, made a number of drawings corresponding to the left and right eye

views of similar objects and arranged a system of mirrors for viewing corresponding pairs of these pictures so that they could be combined when observed by both eyes. He also made a number of original designs of mirror and prism viewers, now known as stereoscopes.

Sir David Brewster invented a refracting type of stereoscope in 1844 which remained in use for some time. It was possible to focus these lenses and to obtain magnified effects. The picture used could be much smaller than those used in the mirror or prism types.

With the discovery and development of photography the use of the printed picture rapidly replaced the drawing.

The first stereoscopic cameras were developed by J. B. Dancer and Jules Duboscy between 1839 and 1850. The smaller plate and film cameras of today employ the same principles.

Film Movies. In 1832 Dr. Joseph Antoine Ferdinand Plateau of Belgium and Dr. Liman Ritter von Stampfer of Austria brought out devices for viewing pictures in simulated motion. These are known as the first motion picture machines.

The next important step in motion pictures was the discovery of photography. The first known use of the photograph in series to produce the illusion of movement was by Coleman Sellers of Philadelphia, Pennsylvania in 1860. In Philadelphia in 1870 the first actual projection of a photographic

motion picture on a screen was shown by Henry Renna Heye.

In 1877 John D. Isaacs, an engineer, was hired by former governor Leland Stanford to take pictures at a horse race to prove the winner. Isaacs set up a battery of twenty-four cameras which tripped automatically as the horse passed. This was the first successful attempt at taking a series of photographs to reproduce the analysis of motion.

In 1887 Thomas A. Edison began working on a mechanism to project a series of pictures but the mechanism lacked the carrier to feed the machine with pictorial images. George Eastman brought forth a new material for the "roller photography" which solved Edison's problem. In a few weeks the Kinetoscope peep show was completed and was demonstrated in his laboratory October 6, 1889.

Thomas Armat of Washington, D.C. contrived a more competent projector known as the Vitascope. Using Edison film, he made a showing at the Cotton States Exposition in Atlanta, Georgia.

Posters. As early as 1700 painters were interested in producing business signs. In 1796 Aloys Senefelder, a Bavarian, invented the process of lithography. Senefelder discovered that a drawing made on limestone with a greasy crayon would transfer to a piece of paper when passed through a press. This process was very cumbersome because of the size and weight of the stones. It was later discovered

that the stones could be replaced by zinc plates which permitted a larger size poster with better design and color reproduction to be made.

By 1900 there were several national schools of poster art. Of these schools Jules Cheret of France became known as "the father of posters". It was he who combined the picture and printing to tell a story with the greatest success.

# CHAPTER IV

## THE USE OF VISUAL AIDS IN A SAFETY PROGRAM

In order to be able to select effective visual aids for use in the shop safety program it is necessary to evaluate the different types of visual aids. It is also important that the visual aids be given the proper application in order to obtain maximum effectiveness. The realization of the importance of an occasional safety campaign is of prime importance.

In industry the use of visual aids is widely accepted as an effective means of enriching the safety program.

### Part A. The Evaluation of Visual Aids

There have been several broad concepts concerning the evaluation of visual aids. Each visual aid has some contribution to make as a teaching aid, yet each one has its limitations.

A thorough comparison of visual aids should be made to prevent a prejudice from becoming the determining factor. The use of visual aids in the safety campaigns conducted by industry provides an indication as to their usefulness.

Comparisons of Visual Aids. It would be very easy to become prejudiced toward one or another of the visual aids.

Some leaders have stated preferences in such a manner that many persons doubt that any agreement will be reached.

We cannot use all of the visual aids that have been created not will an instructor feel satisfied to use only one of the many. On examination it will be found that differences in opinions as to the relative value of the visual aids arises from two unfortunate causes according to Dechert: "First, too many visual aids have been prepared in the wrong medium for their intended purpose. Second, too often the medium is not used effectively in the teaching situation." (3, page 8)

Each visual aid has some important contribution to make as a teaching aid, yet each one has its limitations. The evaluation of visual aids presents a variety of advantages, some of which are unavoidably overlapping. It is apparent that only the broadest of generalizations can be made concerning the comparative value of the visual aid as stated by Dechert:

1. Attitudes and viewpoints can best be developed by using sound motion pictures, sound slide films, and silent motion pictures.

2. Facts, principles, and task instruction can best be imparted by using discussional slidefilms, film strips, glass slides and opaque picture projections. (3, page 9)

It is the writer's aim to describe the various visual aids and their application to teaching shop safety in such a manner as to give the shop instructor some concrete ideas toward selecting the best aids and a method of application.

The Value of Safety Campaigns. The value of occasional safety campaign to accomplish a specific purpose has been a topic for many discussions. Such campaigns are of some value if properly timed and properly conducted. A method or methods must be devised by the instructor to impart a vivid and lasting impression. The method must be one that will not be classed as just a rehashing of "old stuff", but should contain an element of newness. Considering the above requirements, the writer feels that there is a need for a variety of ideas that may be adopted and applied to the safety problems in the school shop.

Industries Reports on the Value of Using Visual Aids in Teaching Shop Safety. The recommended procedure of teaching safety to new employees as made by the National Safety Council includes the use of film strips, sound film strips and motion pictures as effective means for group safety education. The use of posters has been a long accepted aid in training employees and maintaining interest.

## Part B. Types of Visual Aids

When the term visual aid is used the motion picture is usually associated with the term. Although the motion picture has a definite role in aiding education it is by far the most effective means of conveying a visual message in every situation. There are a number of visual aids that can be used by the shop instructor to promote safe habits

among students. Some visual aids can be best used to introduce safety. Others can be used to show action, still others are more adaptable to showing safety articles affording an opportunity to talk about the article presented.

Make Posters. The National Safety Council used posters as an educational method twenty-five years ago and this psychology is just as sound today. The poster material, like other styles, must change with the times and it is the duty of the poster committee to keep up-to-date material.

Two general objectives should be kept in mind when planning a poster campaign for a shop. First, the poster must meet the rigid demands prescribed in the choice of subject matter. Second, the attention of those for whom its counsel is intended.

The effect of modern advertising by means of posters gives a hint as to their effectiveness. The poster gives the advantage of rich color, drama, and action. The success of a poster depends upon the way in which it is exposed or its environment. The person must be drawn to the poster; the poster cannot go to the person.

The basic value of the safety poster lies in the illustration, for pictures are a universal language. Add some color and some drama along with a "sharp" script of a few words and you can reduce accidents. Color plays an important part in making a poster. It is the most eye-catching medium next to motion. Contrast often captures attention but

sometimes it is more effective to use more subdued colors to obtain harmony that causes closer observation when pleasing to the eye. Black or yellow can be read at the greatest distance according to authorities.

Make Charts. A chart presents visual facts and this can be done in a very colorful manner by the inspired person. The alert shop instructor will take every advantage of facts and figures to present the statistics on accident problems so the students may be directed in making suggestions toward solving this problem. A collection of posters can be retained in the library for further reference.

Charts can show the effects of a safety program and may give the student pride of accomplishment. Facts and figures from other shops on special safety problems can be brought in to create more interest.

Make Cartoons. The cartoon has far more influence than is often realized. Many times a timely and forceful cartoon has influenced the opinions and actions of people. The cartoon, when made by a group of students from the shop, can create a lot of attentive thought toward solving a safety problem. Boys that are taking art courses can convey the cartoon needs of the shop to the art instructor and oftentimes can create some very useful cartoons.

Collecting and Displaying Safe and Unsafe Specimens and Objects. Specimens and objects make it possible to

learn many things that would otherwise be unnoticed. It would not be wise to display a model of a safety shoe when the actual object can be obtained. Depending on direct experiences to provide a learning situation will often result in the loss of many learning opportunities. The safety program can be enriched by the display of safe and unsafe objects. A mushroomed head of a chisel, a broken pair of goggles, along with a story of the eyes that were saved by them, a cut-away shoe that shows the protection it can give and the fragments of a broken grinding wheel with a story of how it was broken can be collected by the students and written in an interesting manner.

The collection of safe and unsafe objects must not be just an aggregation of "dull objects"; there must be an interesting approach to the use of these objects and a sense of student participation involved. Too many objects presented at one time tend to confuse students.

Collecting Still Pictures for the Bulletin Board. A picture can be used to supplement and enrich a verbal explanation to an advantage in many cases. Pictures may be presented of several types of safety glasses. Many times the instructor will have the opportunity to obtain pictures that will convey and enrich a safety lesson. The alert instructor will have a collection of safety pictures that can be used for board display or opaque projector showings.

A picture that conveys a clear message transmits an idea in a fraction of the time that can be done by verbal means. A pictures makes the message clear and more definite than any amount of writing. Pictures should be placed on the bulletin board with several things in mind. Too many pictures will create confusion unless they all relate to one very specific subject. The pictures should have a heading and a caption printed and properly placed with the picture. Pictures should be properly placed.

Make Signs and Display. When properly used the sign has considerable value in both giving safety information and maintaining interest. Signs should be truthful, definite as to meaning and written in correct English. For instance, a sign that says "High Voltage" should be used only for voltages that standard practices consider high. Where a warning as to the location of electrical equipment carrying low voltage is desired, some such wording as "Danger - Live Voltage" should be used. All safety signs should be located carefully to be visible to any persons approaching the hazard area. Signs should be neat and well constructed and kept in good condition.

Prepare Safety Slogans. Safety slogans can be very valuable but they must express a worth-while purpose or goal and they must be timely. If a slogan is to be used it must be believed in and lived up to by the instructor on every occasion. If an instructor believes in a slogan and demonstrates that belief by convincing action this slogan should

be posted in a prominent place.

Make Manikins and Display. The still figure presents an opportunity to give a detailed picture of any particular phase of activity.

Many different effects and safety features may be accomplished by a group of these figures. Manikins may be constructed by students in life-size or miniature. Cut-out figures may be used in window displays or in stage demonstrations and tasks. The figures should portray actual accident problems and can be very effectively used.

The Film Strip. The film strip which can be stopped for detailed observation and discussion and can be shown in place of a motion picture is a method of detailed instruction.

The discussion of slide-film (with titles) has the advantages described above and in addition it is applicable to all types of students. The good listener, the good reader, and the good observer, will each have an equal opportunity to learn. Naturally, the approach toward reality and the emotional appeal of the motion cannot be incorporated into the film strip.

Create and Produce Plays. Plays can vividly portray important ideas related to safety. The most important thing to be derived from a play is the dramatization involved. Drama is something that is attention-compelling and has a strong emotional impact and is not easily forgotten.

Plays can be obtained that have been tried and tested, or they can be on an experimental basis whereby the class can dramatize extemporaneously, or groups can be chosen to prepare plays or playlets. The participants in the play learn to understand the character to be portrayed. The reconstruction of the part teaches the student as it is reconstructed.

The value of a safety plan can be seen immediately upon realizing the possible shop situations that could be involved and the number of safe practices that could be utilized. The weak point of a play remains, due to the fact that the play is usually thought of as a method of providing entertainment.

Pantomime or Tableau. Often times the safety features can be brought out by a pantomime or tableau in a very forceful manner. The pantomime differs from the tableau in that the pantomime portrays silent, living action, while the tableau presents a still, living picture.

The most important use of the pantomime is the audience participation while it is being presented. As the players present the pantomime the class can give constructive interpretations of the safe or hazardous situation that is being presented. The class and the instructor can comment and make suggestions in such a way that many safety points will be brought out. The pantomime does not take up as much time as the play and therefore may be preferable in some instances.

The pantomime itself reduces the dramatization almost wholly to the visual sense.

Dramatize Stories. Utilizing the advantages of drama the class can be guided in dramatizing stories that can be found in safety magazines and other safety literature. The daily newspaper often contains an article that could be the basis for a current safety problem of the shop. The students will realize the life-like nature of the true-to-life stories. In many ways the stories can be more meaningful than a contrived play.

The Safety Puppet Show. In recent years the puppet show has become an educational means. Puppetry is flexible enough to be suited to the high school or college student's abilities. Puppetry offers certain advantages that are not found in more formal types of dramatizations. Puppets cost very little in time, money, costumes, scenery, and equipment. As a safety program, the puppet show can involve the entire class--as speakers of parts, manipulators of figures, makers of puppets and many of the other tasks in preparing for presentation.

Puppet plays must be based on action rather than words. The imagination of the instructor is the controlling factor in the use of puppets. Many things pertaining to safety that can not be presented by students can be shown by the puppets. Scenes showing a "worker" falling from an unsafe ladder, dropping heavy objects on the "worker's" foot, and many other

safety lessons such as these can be contrived to provide a meaningful lesson in safety precautions.

The Felt Board. The felt board has many advantages over the chalk board and other display media. The felt board is an excellent aid to the class demonstration because of its adaptiveness to the many things that can be displayed on it. Items to be used on the felt board can be prepared in advance and put in storage for future use. Many items may be obtained for use on the felt board. These items may be prepared by a commercial firm or made up by the shop instructor. Pictures from magazines, photographs, drawings, and small items, can be used. The materials used on the felt board can be stored and used as many times as necessary.

Because of the simplicity of a felt board it may be constructed with a minimum of time and cost. One or two yards of flannel outing, felt, suede, or vello can be stretched over a piece of plywood or stiff cardboard and the felt board is complete. The nap on the cloth will quickly adhere to another such piece of material or sand paper which is glued to the back of the picture.

As the safety lecture and demonstration is conducted the instructor can place pictures or small articles on the felt board. The pictures can be arranged in any manner or readily removed. The felt board presents the advantage of not having a lot of articles in view at one time.

The Bulletin Board and Tackboard Display. The bulletin board is used primarily as a place to display posters, pictures, and brief news items that are new to the student. By the careful direction of the shop instructor the bulletin board may become an action point in the school shop and make a satisfactory contribution toward the safety mindedness of the students.

The success of these activities depends upon several of the mechanics of the bulletin board. The arrangement of items, proper spacing, pleasing use of color and similar considerations, require attention.

When a group of students embark on a bulletin board project to promote safety in the shop the instructor should offer a few suggestions to guide the project in the right direction. Material that is dull and outdated causes students to disregard the bulletin board. The bulletin board must be kept constantly alive by rearranging and adding new material.

Motion Pictures. The motion picture is valuable mainly to present the general idea of safety and not to expand upon any one single phase. The motion picture shows action and how things happen. It shows relationships and furnishes atmosphere. A splitter guard and cover guard can be seen in detail on a 2" x 2" color slide; but the action and function of these articles can be presented in a more meaningful way in a motion picture. The motion picture is

nearer to reality or to the observational end of the learning process than any other visual aid. The motion picture is an edited version of reality and therefore reality can be heightened.

The uninterrupted attention of the student is held during the entire length of a motion picture because of the attraction that is provided. The room is dark except for a white stream of light that pours action and color onto the screen. The well selected safety film can often leave a group of students with some very vivid impressions on safe procedures.

There are several important steps to be considered in the presenting of a motion picture. The film should first be previewed to determine if the film is suitable for the safety program. The film should also be on a level of understanding for that age group. The things that are portrayed in the film should be previewed orally in the class prior to the film showing in order that they will know what to expect. The instructor should be familiar with the projector or a trained operator should be obtained. The film should be discussed immediately following the showing or as soon after as possible. As much detail should be discussed as possible as well as the theme of the whole film.

The cost of film is quite large and its effectiveness must be carefully weighed. The film cannot take the place of an instructor but can facilitate thinking and problem solving. The most serious limitation of the motion picture

is its continuous tempo. There are no stopping places once a film is started. The students must conceive at the rate of the presentation rather than at their own rate.

The Opaque Projector. The opaque projector can project an enlarged image of many opaque materials onto a large screen. These materials include photographs, illustrations from books or magazines, printed or handwritten materials, charts, posters, or small objects. The materials for use in the safety program can be drawn from varied sources and applied in a unique manner. The material can be taken from the daily newspaper or a safety magazine and used without waiting. The material may either be mounted on a stiff paper base or projected directly from the magazine or book.

The advantages of an opaque projector is that the whole class can view a single picture at one time. The projector is silent which permits the necessary amount of discussion about the picture. The projector is relatively inexpensive and the materials used are often free. The projector has no moving parts to get out of order. It dramatizes material through the intensity that comes from magnifying a picture in a darkened room.

Models and Mock-ups. The model is a recognizable imitation of the real object. It is not necessarily workable in a mechanical sense. The mock-up usually will not show the entire object but will show in exact detail the

workable mechanical parts. The mock-up concentrates on the elements of the object. The advantage of a mock-up is due to the fact that certain parts or functions can be emphasized while distracting elements can be excluded. The model can be on an enlarged or smaller scaled size than the actual object thereby making it possible to exhibit an object that would otherwise be unobtainable.

The model or the mock-up may be used in many instances by the shop instructor to convey meaningful experiences in the safety program. For example, dangerous parts of machinery can be made up and used to explain the danger involved. A floor plan of a factory can be laid out to show danger areas of machines and the danger zones when material is being handled. A few objects displayed at one time will create an interest in each object. The items should be placed in such a manner that the students can handle and study them.

The Stereoscope. The stereograph is prepared by using two cameras, or a camera with two lenses, which photographs an object from two different angles, these angles being approximately the same as the angles from which the human eye sees an object. These pictures are printed and mounted side by side on a piece of cardboard. When viewed with a stereoscope both pictures merge into one scene and bring out not only height and width but depth as well. The stereoscope is expensive. There are thousands of pictures that

can be used in the stereoscope.

The main advantage of the stereograph is that it presents a more realistic view than can be achieved by a regular photograph. The stereograph has its main application to individual study which is also a limiting factor. Individual instruction is one of the ideals of modern education. The student can study many safety methods with the aid of the stereograph.

Slides on Safety. The glass or the kodachrome slide can provide a good source of teaching material because of its many advantages and flexibility. The following advantages are given by Weaver and Bollinger:

1. Simple equipment. The projector is very easy to set up, operate and maintain.

2. Storage space. A very large number of slides may be stored in a relatively small space.

3. Sketches and drawings. These may be well made with mechanical drawing instruments, the use of which is preferable to freehand blackboard sketches.

4. Local manufacture. The simplicity of glass slides makes them very easy to produce as they differ very little from the making of any photographic print. The teacher can make his own slides to supplement the commercial product and show things of local interest to simplify further the instruction.

5. Expense. The making of slides of all kinds is relatively inexpensive and the cost may be assumed by the average teacher.

6. Variable continuity. The slides are individual units and may be arranged by the

teacher in an order that suits his purpose. He can use as many as he desires at any one time. If he is using slides which are a part of an organized series, he can omit those which are of no immediate concern and arrange his own sequence.

7. Rate of showing. The rate of showing the slides is under the full control of the instructor. He can stress important points, ask questions, turn back at any time for check-up and review or spend as little or as much time on an individual slide as he may wish. Some of the projectors are so arranged that a pencil may be used to point out certain features on the slide. The pencil is projected with the picture and serves the same purpose as a pointer used at the screen.

8. Utility slides are very helpful during a lecture or discussion to amplify a point or clinch essential facts.

9. Brilliant illumination. If a large lamp (300 to 500 watts) is used it is possible to provide satisfactory projection under daylight conditions in an ordinary classroom. The higher intensities of light eliminate the need for darkening and permit normal procedure in the classroom.

10. Indefinite use. The life of the slide is indefinite if carefully used and properly stored. Because of the glass protection there is practically no deterioration.

Limitations of glass slides:

1. Fragility. The glass slide is naturally subject to breakage. The type binding is somewhat of a protection, although the slide may be broken in handling. It also may crack as a result of the heat from the projection lamp when permitted to remain in the machine too long. Simple cooling devices on the later model projectors minimize or eliminate the danger of cracking in the machine. The slide may become unusually hot and therefore very difficult to handle if a cooling device is not provided.

2. Attention needed for projection. Although the projector is simple to operate the slides must be placed in the projector in the right position. Slides may be arranged in about eight positions but only one will provide correct showing. This requires the careful attention of the operator.

   To eliminate all difficulty a thumb marker should be placed on each slide. This is a small white gummed strip with a red dot at one end. If the label is fixed in the proper position, the operator's thumb will be on the dot when inserting the slide in the machine with the right hand and the slide will be in the proper position for correct projection. The title or number of the slide can be printed on the white portion of the marker.

3. Lack of motion. Obviously slides are a disadvantage if motion is essential to the understanding of the subject matter. This particular limitation, however, should in no way discourage the use of slides. There is a limitless amount of subject matter that may be placed on slides that does not involve motion for complete understanding. (6, pages 183-185)

Album or Scrapbook. As a safety project that involves individual interest the making of a scrapbook can be very effective. Pictures can be taken by the student to form a safety sequence on a phase of safety that he thinks is important. Pictures can be collected from safety magazines along with stories that are in the magazines or that are composed by the student. Each scrapbook can include such things as a safety creed which was adopted by the class. Cartoons may be taken from magazines or drawn by the students and inserted alternately among the more serious subjects.

A safety pledge sheet can be developed by the class, signed by each student, and inserted in the scrapbook. A dictionary section can be placed in each scrapbook giving a list of safety words and terms with a suitable meaning for each. The writing of each meaning could well be formulated by the students under the leadership of the instructor.

An accident barometer can be kept during the school year showing the increase and decrease in shop accidents. A collection of accident statistics from industry or from other shops can provide an interesting section of the scrapbook.

Flash Cards. The underlying purpose of the flash card is its use in stimulating memory and increasing speed in recognition of safe and unsafe situations or objects. The flash card can be used as a safety check in test form or used to create oral class response. Flash cards can easily be constructed by the instructor. Pictures can be drawn in suitable sizes or detailed drawings can be made with mechanical drawing instruments.

# CHAPTER V

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This chapter contains a summary, conclusions, and recommendations for further study. The information presented was obtained as a result of the study of visual aids in two college courses and the study of many books on visual aids in the Oklahoma A. & M. College Library.

Summary. The preceding chapters include a history and philosophy of general education and industrial arts, the development of visual aids, and the description and application of various visual aids to the safety program. The writer mailed 94 questionnaire cards to industrial arts instructors in Oklahoma schools; 52 cards were returned. The replies on these cards indicated the lack of use of many of the visual aids which could add much to the shop safety program.

Conclusions. A visual aid presentation is more effective than a completely verbal one. Any person who realizes how learning takes place recognizes the importance of sight in the process. Approximately 85 per cent of the total knowledge gained by students is acquired through the sense of sight. Despite the truth of the above statement it is

suprising how many shop instructors disregard the potential value of the visual aid.

To make the safety program a meaningful experience with some expectancy of future pupil application, the correct visual aid must be chosen and properly applied. This problem brings about a need for the knowledge of the various types of visual aids. It is necessary to be able to compare the different visual aids and make an evaluation of them. Certain visual aids are especially useful in introducing safety articles, such as safety shoes, goggles, and gloves. Other aids are suitable as every day reminders of safety. Still other visual aids present a continuous action story that conveys a general concept of several safety precautions and procedures.

Recommendations for Further Study. An investigation into the making of posters, charts, and slides should be made. Drawings or pictures should be included to illustrate the making of the slides and models. A knowledge of the different methods of making visual aids would be useful to the industrial arts instructor.

A study of projection equipment, its operation and care, would be valuable. This study could include many pictures of available projectors, types of screens and loudspeakers.

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# APPENDIX A

## QUESTIONNAIRE CARDS MAILED TO NINETY-FOUR INDUSTRIAL ARTS TEACHERS IN OKLAHOMA SCHOOLS

Dear Industrial Arts Teacher:

Will you please check the visual aid that you use most in teaching shop safety:

Film Strips___ Safety Films___ Prepared Slides___

Posters___ Other Methods_____

This information will be very helpful to me in preparing a report for a master's degree at Oklahoma A.&M. College this summer. Your assistance is very much appreciated.

Yours very truly,

Harry E. Shinn
3012 NW 18th Street
Oklahoma City, Okla.

VITA

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REPORT TITLE: THE USE OF VISUAL AIDS IN TEACHING SHOP SAFETY

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