A STUDY OF THE PURPOSES AND FACTORS OF VISUAL EDUCATION IN GRADES ONE TO EIGHT

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CHAPTER I

INTRODUCTION

If school instruction is to become more meaningful, visual aids must be used to enrich and vary the pupil's concrete experiences.¹

There is an old Oriental saying that the distance between the ear and the eye is small, but the difference between hearing and seeing is great.

More terse and not less forcible is the proverb, "To see is to know," which expresses a growing tendency in the human mind.²

Dent reports that in the early stages of the development of the use of visual aids, it was thought that the eye was all-powerful in the educative process. Some were enthusiastic enough to state that 80 to 85 per cent of all that one knows is learned through the eye. Others surmised that it would not be long before textbooks would be replaced by pictorial materials substituted for the printed word.


In a closer analysis it is thought by Dent that the true factor of learning has evolved another term, "visual-sensory aids," which seems to be gaining favor among the leaders of the field. This term, "visual-sensory" aids, becomes a more nearly true statement of the situation in the average school room than either "visual education" or "visual instruction."

In this consideration, the term "visual aids" is used to include motion pictures, still films, slides, pictures, charts and diagrams, posters, exhibits, and objects or replicas. Some of these aids are not always visual alone, but sometimes may be in audio-visual combination. Visual education or the use of "visual aids," is too frequently considered largely in its subject-matter aspect. In reality visual education consists of a method or type of presentation of practically all subject-matter.

When asked: "What are visual aids?" most people are only too quick to answer: "Motion pictures." A recent


authority says that motion pictures are valuable visual aids, but these are not the only visual aids available to the classroom teacher, nor are these the ones most widely used in current school instruction. Neither are lantern slides or other mechanical devices which involve the projection of a picture on some flat surface, preferably a screen, the only other visual aids. On the contrary, the motion picture and the lantern slide are just two of the many visual aids available.

A visual aid is any picture, model, object, or device which provides concrete visual experience to the learner for the purpose of (1) introducing, building up, enriching, or clarifying abstract concepts, (2) developing desirable attitudes, and (3) stimulating further activity on the part of the learner.

I. THE PURPOSE OF THIS STUDY

The purpose of this study was to present a study of the purposes of and factors affecting visual education in the elementary grades.

II. THE PROBLEM

The major problem of this study was to determine the purposes of and factors affecting visual education in the elementary grades.

The various questions arising in the investigation of this major problem were:

1. Can visual education be justified?
2. What are the objectives in a visual education program?
   a. Economically
   b. Socially
   c. Ethically
3. What factors are vital to a visual education program?
   a. Teacher
   b. Child
   c. School
   d. Materials
4. What is the historical background of visual education?
   a. School Journey
   b. Museum Materials
   c. Motion Pictures
   d. Still Pictures
   e. Graphic Materials
5. What was learned in reviewing available literature?

6. Should Indiana State Teachers College offer a methods course in visual education?

III. METHOD OF STUDY

Since there has been an enormous amount of material published in recent years, much of which is available to any teacher, it was decided that reviewing literature available to the writer was an appropriate method of securing information. That which appears in this study was the result of careful examination of the literature and the transcription of pertinent data found therein.
CHAPTER II

VISUAL EDUCATION JUSTIFIED

It has long been thought that the visual aids do make some definite contribution to education. The aids vary from the concrete (the model) through the stages of photographs, slides, and diagrams to the silent and lately the sound motion pictures. The aids present most pupils with a vivid image of from flat or lifeless to moving or living pictures. No one has seriously questioned the value of such contributions, but the question has been raised frequently whether the emphasis on concrete experiences which is provided by the visual aids is not greater than justifiable on the ground that it holds the attention too long on material objects and their characteristics and diverts it from the more abstract processes of thinking.

On the other hand, it may be assumed that, in addition to the characteristic contributions mentioned above, visual aids may increase the rate and improve the quality and longevity of learning; develop stronger and more fertile interests; increase the more appropriate and satisfying use of libraries and books; and improve the vocabulary and with correctly constructed sound films, improve the continuity of speech.
The indiscriminate use of visual aids may produce an attitude of passivity in the learner. It is only when these are used to supplement other types of presentation that these are justified as teaching devices.

I. A NECESSARY UNIT

The question asked by many an American business man when conversation turns to visual education is "Why don't the schools use movies for teaching?" The business friend goes through so-called "balanced" programs consisting of the feature, a comedy, an "educational", and a news-reel. It requires no great imagination on his part to vision "what our children might have" as Charlotte Perkins Gilman puts it. He has seen many articles and editorials on the subject and he feels that teaching with it must be a good idea. Even though he has little contact with pedagogy and its methods he knows that pictures do teach. His children are in school and as a taxpayer he feels that motion pictures and other visual aids properly integrated with classroom procedure would economize time and effort and produce a superior product.

Dent shows that visual aids are a necessary unit by stating that since the printed letter or word has become further removed from its ancestor, the picture, it has become more and more abstract; more and more difficult for the human mind to understand fully. A technical discussion of almost any subject before an average group is understood only by those who have had training in that field. The same discussion, presented in the usual language of the average individual, might become clear and understandable, particularly if a few pertinent illustrative materials were used. Symbols are recognized and thought of only in terms of past experiences. Dent concludes,

Accordingly, it is imperative that we include in our educational procedure the maximum number of those things or representations of things which aid in clarifying thought—in making objective the abstract.

The main distinction between visual-sensory instruction and other instruction is a matter of emphasis. Visual-sensory instruction emphasizes the value of concrete imagery in the learning process, whereas "other instruction" stresses the importance of verbal imagery. Visual-sensory education, should not be thought of as a

method of instruction, for the materials used in visual-
sensory education are valuable only as these aid the in-
structional process.

The main justification for discussing visual-
sensory aids to instruction apart from general devices
is the fact that there has developed rightly enough a
strong movement in schools to centralize visual-sensory
materials as these have become increasingly common through
the rapid growth of photography and sound reproduction.
The movement toward centralization was furthered by:
(1) the development of elaborate educational departments
in museums, such as the Commercial Museum of Philadelphia,
the American Museum of Natural History in New York, and
the Field Museum of Chicago; (2) the establishment of
school museums, such as those in St. Louis, Reading, and
Cleveland; (3) the development of visual instruction ex-
tension service in state universities, as at the University
of Wisconsin; (4) the growth of city school bureaus of
visual instruction, for example in Newark, Chicago, Los
Angeles, and New York; (5) the use of the radio in edu-
cational institutions; and (6) the organization of com-
panies to manufacture and distribute materials and equipment

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3 F. Dean McClusky, "Basic Values in Visual-Sensory
A second reason for a separate discussion is found in the fact that in general or special methods textbooks in education, little attention has been given to the use of visual-sensory materials. Finally, a critical analysis and evaluation of the situation is needed before mistakes are made which will detract from advantages of using other devices.

Inasmuch as the main distinction between visual-sensory instruction and "other instruction" is a matter of emphasis, the former emphasizing the value of concrete imagery in learning, the latter stressing the importance of verbal imagery, one will recognize basically, both concrete imagery and verbal imagery supplement each other in the instructional process.

Inasmuch as more books are used in American schools today than ever before, visual-sensory instruction will serve as a safeguard against verbalism.

Another explanation of the failure of informed individuals to behave in accordance with their knowledge is man's great difficulty in translating purely verbal ideas into action. In western civilization no book has received greater attention than has the Bible. For centuries the Christian nations have been taught the doctrine of the "brotherhood of man" and "to love one's neighbor"
yet these same nations staged in 1914-1919 the most colossal war in human history. It would appear that these Christian teachings are as yet little more than nice-sounding phrases.

Some means must be developed to clarify the language of the experts, faith must be reestablished in the leaders, and schools must devise a way to translate verbal patterns into intelligent human behavior. There is a need for more directness of speech, more parables, more word pictures, more pictures, more visualization, and more of real living in teaching.

This thesis, therefore, is that teachers should talk less about "education for life" and other high sounding verbalisms, and proceed to introduce concrete experiences of every sort into the instructional process, so as to make word patterns dynamic. School boards should spend as much for visual-sensory materials as they do for books. Every large-scale experimental comparison of visual-sensory instruction with verbal forms of instruction has shown an advantage for the visual instruction. The Payne Fund studies demonstrate clearly the dynamic power of motion picture as an educative medium. To see, to hear, to smell, to touch, to taste, is the essence of life. Words merely describe it. Teachers who depend solely upon books are failing the child and are misusing the
books as well. The modern classroom should be as fully equipped with the materials of visual-sensory instruction as it is with textbooks. Both are essential.

The use of visual-sensory instruction may be traced back through the early educational history of mankind. In primitive times boys were taught to hunt and to fish and girls to cook through imitation, observation, and participation, plus the necessary language explanation. Early records were picture records. Cave men drew pictures to warn and to inform.

There is a notion, substantiated in part by experience and by some research, that the generous use of visual-sensory aids tends to reduce the number of school failures. Brighter pupils seem to excel in abstractions which have to be made concrete for the slower. Visual-sensory aids are helpful in making these abstractions concrete.

Visual instruction can be a definite aid to all departments and all classes in the school. It is a potential aid in the work of every teacher, an essential part of all methods.

II. CORRELATION WITH STUDIES

Visual instruction should not be considered a distinct mode of instruction comparable with a unit plan.
In fact, it may be considered an aspect of this or of any other general method of learning, to be called into play whenever visual materials will facilitate learning. Its close relation to the unit plan is made clear at this point.

The four stages of the unit plan as set forth by Umstattd are Introduction and Attack, Study and Work, Integration and Application, and Appraisal of Outcome. Several illustrations will indicate the relation of visual aids to each stage. A quick introduction and a vigorous attack may result from attractive textbook pictures, from a bulletin board of pictures obtained from magazines, newspapers, or the teacher's files, from five or six well-selected slides shown upon the wall or upon a screen at the outset of a unit, from a few graphs which present challenging facts, or from a short reel of movie film related to the topic.

The study-and-work stage progresses more successfully when pupils have access to pictorial, graphic, or objective materials related to the problem. One teacher of integrated mathematics takes his class to a bridge

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to study applications of the triangle; a teacher of social studies has his class collect cartoons on the "New Deal" and regularly compile a set of pictures from newspapers on each problem studied; a teacher of general science uses a series of sound motion pictures to accompany his seven main units of study during the year; and all alert teachers make frequent use of blackboards, charts, maps, and models whenever need for them arises in the study of the unit.

During the integration-and-application stage frequently the pupil is encouraged to summarize his work in graphic or booklet form. Thus a class in sociology prepares a graph showing the number of persons of each nationality in the community; almost every biology class has an aquarium and collections of woods, rocks, moths, bugs, many of which are prepared by pupils as they become interested in various problems; many classes prepare charts, models, or maps of various types which bear witness of progress in history, geography, or other fields of interest. Such activities should be used to supplement the other experiences of the integration-and-application stage whenever possible.

Visual aids may be of value also in the appraisal-of-outcome stage of a unit. Thus the blackboard may be used in summarizing the outcomes, and the finished products of various projects may themselves be evidences of the inner
growth of pupils. Likewise teachers may make use of visual aids in testing. For example, one general science instructor tested the pupil's understanding of the relationship of the earth, moon, and sun by a diagram showing the orbits of the earth and moon, the directions of the sun's rays, and the observer's location. The pupil was instructed to locate the new moon, the full moon, the positions of the several bodies at the lunar and solar eclipses, and to designate other relationships. Similarly a teacher of biology or any other subject may use as a test a diagram of any object of study, with instructions to name the parts. Maps may be used in like manner to test the pupil's knowledge of place geography.

It should be quite clear from these few illustrations that visual instruction should be used at all stages of the study of any unit to clarify, to intensify, and to vivify the mental images which the pupil forms as he learns. The clear-cut images which result from seeing the objects give meaning to the words which name the objects. When the images involve processes and relationships rather than just objects, a clearer understanding is promoted by having the impressions from the ear intensified by those from the eye. The truth of these statements will become more evident as the study continues.
CHAPTER III

OBJECTIVES OF A VISUAL EDUCATION PROGRAM

It is doubtful if any individual is a pronounced auditory, motor, or visual type. One consequence of these differences was the attempt to label different people with respect to their prevailing type of imagery. Among the types named were the visualizers; the audiels, and the motiles. As studies on imagery continued, however, it turned out that the type of imagery employed by any one person might vary with the nature of the task and that there were a large number of intermediate cases. As a matter of fact, the number of intermediate cases became so great as to lead Thorndike to say,

Instead of distinct types there is a continuous gradation. Instead of a few 'pure' types or many 'mixed' types, there is one type—mediocrity. Instead of antagonism between the development of imagery from one sense and that from other senses there is a close correlation. ¹

The auditory method of presentation is probably better for young children. However, as age increases, perception becomes more complex and by the time the child

reaches adolescence visual methods in education become increasingly more effective. The functions of visual education are several but may be grouped under three general headings, economical, social, and ethical.

I. ECONOMICAL

To show a picture of a model of an object is frequently the quickest way to give an understanding of it. Furthermore, seeing an object or process results in clear-cut mental images which reduce the need for subsequent remedial instruction. Time may be saved also in launching a problem with visual materials, because the attention of the pupil is attracted without delay. After a problem has been studied, the review is facilitated by the use of graphic and pictorial aids. Inasmuch as the curriculums are crowded with activities intended to enable the child to keep pace with the rapidly moving society, time-saving is not the least important function of visual education.

II. SOCIAL

A series of slides or stereographs, or a reel of motion pictures presenting the customs of a person the

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same age in other lands or of earlier times enables the learner to be that person and to have his experiences. Admiral Byrd's pictures have carried thousands to the Antarctic, while the authentic motion pictures have enabled pupils to make world-wide trips which are almost real to them. In fulfilling this function visual aids may be laying a good basis for a sane internationalism merely by promoting mutual understanding and respect.

Every well-prepared textbook for the elementary schools carries carefully selected pictures or graphic materials to supplement the written account. A skillful teacher often makes rough sketches on the blackboard to clarify or elaborate the discussion. An English class which has read David Copperfield is invited to see the film. A discussion of irrigation is supplemented by a series of slides. The visual aids not only add to the other learning; these clarify, enrich, and help to organize it as well.

III. ETHICAL

One of the chief functions of visual education is to give the learner true mental impressions, or concepts, at the time he first learns of an object or process. Correct initial concepts prevent subsequent errors and obviate the need for diagnostic and remedial teaching. A teacher
cannot be certain that his verbal description will convey impression, especially if he finds it difficult to compare the object being described with something with which the pupil is already familiar. The difficulty is removed immediately if a picture is available. It is essential, however, that the size of the object be indicated or that something known to the learner appear in the picture with the unknown object, as for example, a man or a dog beside the elephant in the first picture of that animal seen by a child. The concepts will be more clearly acquired if additional characteristics are given in the picture, such as color, sample habitat, typical food, or other suggestion of life habits of a previously unknown animal.

The conveyance of correct initial concepts is achieved through various other types of visual aids, such as real objects in the classroom; trips to observe processes, sites, or objects; graphs of records or trends; models, diagrams, or maps; and motion pictures.

The mind of a child would remain blank if it received no impressions through the sense organs. It is dependent upon the sense organs for its development. It therefore follows that a function of visual education is to increase the number of impressions received through sight. The more clear-cut and true visual image the learner acquires about anything, other things being equal,
the better will he understand it. For example, in any field of natural science a pupil must become able to visualize a large number of specimens. The wider his sensory experience in this respect the better his grasp of the field, other aspects of learning remaining constant.

Visual aids facilitate learning, and very likely aid retention, because these intensify the impressions. Any visual means of transmitting impressions of form, size, color, motion, or other characteristics of the subject of study has a strong appeal and causes the imagery to become firmly imbedded in the mind.

To see real objects or pictures of them is more lifelike than to read about them or to hear someone describe them. Visual aids, whether used in the classroom or visited outside, thus add life to the learning process by making the experiences real rather than verbal. This function of vitalizing instruction is in itself sufficient justification for the expense and effort involved in visual education.

Several of the functions previously discussed imply that visual aids give experiences with concrete things. Giving such experiences is in itself an important function inasmuch as it combats the typical classroom tendency to become too abstract. Unless words convey definite meanings, these do not stimulate correct thinking. Such visual aids
as real objects or models give definite meaning to many words and thereby combat verbalism, or the use of words without attention to thought.

In a situation a teacher's primary purpose in using visual aids may be to arouse interest in activities about to be suggested. A few well-selected pictures for the bulletin board will arouse curiosity in a subsequent unit even before the work of another has been completed. An illustrated lecture may often serve to introduce a new unit and to stimulate thinking in the problem. A sound motion picture motivates still better in materials in which motion plays an important part.

The first step in arousing interest is to attract the attention of the pupil. Visual aids achieve this step in a rapid and effective manner. These are likewise of value in building and sustaining a lively interest as the unit progresses.

Enough has been said to indicate that visual instruction does vary classroom activity. The teacher may sometimes have this as a chief purpose, although it is usually incidental to such purposes as motivation, vitalization, enrichment, or clarification.
CHAPTER IV

FACTORS IN VISUAL EDUCATION

Since the educational system is so developed that one factor by itself will not determine the efficiency of any method of imparting knowledge to the learner, one generally comes to believe that a few factors may be disregarded. However, in the analysis of the educational system, it will be discovered that the factors involved are too numerous to enumerate. Nevertheless, if there is to be a well-rounded and efficient system of training, all of these factors, from time to time, must receive due consideration as individual cases demand. These factors, as they are considered in this study, have been grouped under four general headings, teacher, child, school, and materials.

I. TEACHER

In a true sense the role of the teacher is that of a skillful guide who is directing the journey of those whom he teaches. If they are to make progress in the right direction, certainly the guide should hold the destination clearly in mind.1

As with an artist, success lies in a sensitiveness to what is worth while, and in holding the interest for the particular age level. The teacher must be a student of child psychology and must include all children in the group.2

If teachers will first determine the objectives of instruction, they can then determine whether visual aids will contribute toward the attainment of the objective and which particular aid lends itself best toward this end.3

II. CHILD

The truth must not be lost sight of, that the object of all professional efforts is the child, his needs and interests. Enthusiasts are apt to become so absorbed and interested in theories and attractive devices that they seem to lose sight of what it is all about, namely, the child.4

For the present-day elementary school child, the study of the world about him constitutes a most vital part of the school curriculum, since it is almost a fundamental axiom that every person must understand his environment in order to cope successfully with it. To help the children in the acquisition of this knowledge and

2 Margaret A. Lindquist, "A Film Aided Cleanliness Program," The Classroom Film, Volume 2, Number 2, June, 1936.


understanding, teachers and supervisors of elementary grades plan their course of study around the central idea of the child living in an ever-widening environment.

The possibility of broadening the experimental background of school children through contact with life situations in the school journey and with things and processes of life in the school museum has been indicated. But the world is still too large for every child to come in direct contact with all its interesting and vital situations, and the school is too small to house the significant parts and representations that can be brought to school.5

As illustrated in Chart 1, page 25, the teacher begins in Grade I to help the child to evaluate his early surroundings. The child's small universe is just now extending to include his school, the nearest store, and the neighbor's back yard, as well as his own. He now takes some responsibility for the care of his own possessions, his clothing, his garden, his pets, and also his safety and conduct on the way to school or at play about the neighborhood.

By the time the child reaches the intermediate and grammar grades, he comes to assume more and more responsibility regarding his economic and social environment. His curiosity reaches around the earth. It reaches outward into space and backward into time. More and more

"The Child" is represented as at the center of his environment, which is enlarged from year to year and from grade to grade. Circles are not concentric, since one year's growth may be more in one direction than in another. There are no hard and fast dividing lines from grade to grade.

* Elsie Flint Neuner, "Films as a Supplement to Experience in Elementary Science," Classroom Film, Volume 3, Number 1, March, 1938.
frequently now his questions begin with "why" and "how" and less often with "what".

There is a danger of "soft pedagogy" and of suppressing the development of imagination if visual-sensory materials are unwisely used. Children must be encouraged to take an active mental attitude toward visual lessons. The child's activity must go beyond mere entertainment and "looking". He must develop a study attitude toward visual-sensory aids. Slides, et cetera, are more easily "studied" than are motion pictures. This fact limits the usefulness of the motion picture unless it can be shown as many times as necessary. Books have a big advantage over motion pictures in developing the study attitude because of the ease with which they can be "reread".

III. SCHOOL

First, let one consider for a moment just what the function of education and the public school is according to modern thought. In discussing this problem Herbert Spencer says:

"How to live? ... this is the essential question for us. Not how to live in the mere material sense only, but in the widest sense. The general problem which comprehends every special problem is the right ruling of conduct in all directions under all circumstances. In what way to treat our body; in what way to treat the mind; in what way to manage our affairs; in what way to bring up a family; in what way
to behave as a citizen; in what way to utilize all those sources of happiness which nature supplies. . . how to use all our faculties to the greatest advantage to ourselves and others. . . how to live completely?

If this philosophy is accepted as the goal of modern education, it is evident that the public school must organize its curriculum and methods of procedure to meet definitely the need of child life, namely, the opportunity to develop happily and normally.

Public school education should therefore be not only practical, but it should be appealing to the child; and in order that it may be appealing, children must be allowed to participate in interesting experiences which are natural to life outside the school.

The school has an increasingly heavy responsibility in preparing boys and girls to meet intelligently problems of the highly complex social order. The world of the learner today is vast; new areas of study, new critical issues are constantly appearing. There are countless facts to be assimilated into generalizations, the tools for thinking; there are new controlling appreciations and attitudes to be fostered.


Education must keep pace with these demands. Not only the objectives and materials of instruction, but the techniques and devices of teaching must undergo a continuous process of appraisal and improvement, if the educational system is to be efficient in achieving its purposes. The scientific and technological advances have created new mediums of communication which must be scrutinized for their possible contribution. Every device for bringing reality to the learner and for enlarging the scope of learning should be explored for its possibilities. In the scrutiny of methods and devices for attaining modern objectives of education, it is important to consider the new mediums of communication which have resulted from scientific and technological advances.

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 job of living. The motion picture, the radio, and the typewriter have not only brought untold wealth and greater efficiency to the business world; they have greatly enriched life generally in every corner of the globe. When such modern devices are common and necessary in the home and business world and have actually become a part of life itself, the school, as a social institution, cannot properly content itself with obsolete methods and antiquated equipment and expect to attain any satisfactory degree of efficiency in training boys and girls to meet the problems of current life. School and life must be one and the same and modern school procedure must be up-to-date
and progressive. Not to endeavor to keep pace with life is little less than educational suicide.\textsuperscript{8}

Since governments have enacted compulsory-education laws and since the school is held responsible for maintaining all lines of social progress, the school is therefore under the necessity of providing rich and practical curricular advantage for its pupils. Modern psychology is revealing better ways and means of working with children and mechanical science is developing certain educational tools that seem destined to bring a very great contribution to education and to offer one of the most hopeful remedies for eliminating waste and increasing efficiency of school work. The remedy is visual instruction and its important tools are known as visual aids. The adequate use of visual instruction in teaching is coming as a result of seeing its effective use in the commercial and industrial world.

The foregoing notions of basic values in visual-sensory instruction are in need of much refinement. The new techniques of presentation are on the whole still matters of the future. The field is wide open and the opportunity is great. Business and advertising have been

quick to seize upon and to utilize the visual-sensory approach in selling. The school will not be able to hold off much longer the inevitable impact of these vitalizing influences upon basic instructional procedures.

IV. MATERIALS

An educational tool is of interest to the teacher only to the degree that it may help pupils solve their childish problems and stimulate their interest in gaining new knowledge, thus aiding them to learn happily and live abundantly.9

Parents know that whatever children can see or touch fascinate them. Teachers realize the value of having a cotton boll, a rice plant, coffee beans, latex, or silk worms at hand when these things are being studied.10

It would be a tremendous task and an almost impossible one to have at hand available object specimens which would correlate with the subject matter of the elementary curriculum. There are other visual aids which are more compact and more economical to use and store.11

Dent lists the visual aids as follows: classroom

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10 Picture Aids Supplement (Bloomington, Indiana: Indiana University, 1939), p. 15.

experiments; blackboard demonstrations; the school journey; plays and pageants; objects, specimens, and models; the school museum; graphs; charts; maps; globes; the sand table; the electric map; photographs and prints; stereographs; glass slides; film slides; silent motion pictures; and sound motion pictures. However, Hoban, Hoban, and Zisman have grouped practically the same aids more homogeneously and for the purpose of this study their grouping is used. Hoban, Hoban, and Zisman grouped the visual aids as follows:

I. THE SCHOOL JOURNEY

II. MUSEUM MATERIALS
   A. Objects
   B. Specimens
   C. Models

III. THE MOTION PICTURE
   A. Silent Motion Pictures
   B. Sound Motion Pictures

IV. THE STILL PICTURE
   A. The Stereograph
   B. Glass Slides

C. Film Slides
D. Flat Pictures (Photographs)

V. GRAPHIC MATERIALS
   A. Illustrations
   B. Cartoon
   C. The Poster
   D. Maps
   E. Charts
   F. Graphs
   G. The Blackboard
   H. The Bulletin Board
CHAPTER V

HISTORICAL BACKGROUND OF VISUAL EDUCATION

Visual aids as a help in instruction are by no means new. It is difficult to determine the beginning of the use of visual aids. The chances are rather great that these are the oldest aids to instruction and that these antedate the era of articulate language. Undoubtedly their use must go back to the ancient picture-writing and early alphabets. Long before the time of the alphabet crude drawings were made in the sand and elsewhere to aid in learning. There are innumerable evidences of visual aids which appear in the ancient caves and tombs which have been unearthed. These bear drawings of animals and representations of events which were common to some early period of history.

I. SCHOOL JOURNEY

Without any doubt whatsoever, the school journey is the outgrowth of what was the most primitive of educational methods. In the very earliest of times, boys were taught to hunt, fish, and make their weapons by the men of their tribe and the girls were taught to cook by the women. This little bit of teaching, carried on
through imitation, observation, and participation plus
the necessary language explanation, is very similar to
the present school journey.

Nothing more is heard of anything resembling the
school journey until Grecian History at the time of Aris-
totle. The Greek Peripatetics furnish a striking example
of teacher and pupil groups going direct to the natural
situation for first-hand knowledge. In that age it was
a common sight in Athens and its environs, to see the
venerable Socrates and his disciples here and there in
the practice of observation, discussion, and meditation.

But it was England that first placed the school
journey on an organized, systematic plane. In 1905,
school journeys received official sanction in England,
and, in 1908, the London County Council made subsidy
provisions for them in its school code. As a result of
this impetus the British School Journey Association was
organized. In this association were banded together,
for mutual helpfulness, all the British schools and teachers
interested in and making use of school journey procedure.
The association publishes an annual, The School Journey
Record, whose pages contain much valuable information on
all phases of school journey activities. While England
has what is considered the most completely organized
school journey movement, many European, some Asiatic,
and some African countries are using this instructional medium on a large scale.

While not so definite a part of instruction as in some European countries, school-journey practice is growing rapidly in the United States. School groups are a common sight in the National and State Capitals, at natural curiosities and scenic spots, in art galleries and museums, at local and national industries, government centers, and at historic and literary shrines.

II. MUSEUM MATERIALS

The true significance of the word museum may best be appreciated through an allusion to the ages which preceded its origin; when ancestors, hundreds of generations removed, were in the midst of those great migrations which peopled Europe with races originally seated in Central Asia.

It has been well said that the early history of Greece is the first chapter in the political and intellectual life of Europe. To the history of Greece one goes for the origin of the museum idea, which in its present form, seems to have found its only congenial home among the European off-shoots of the great Indo-Germanic or Assyrian division of the world's inhabitants. Long centuries before the invention of written languages
there lived along the borders of northern Greece, upon
the slopes of Mount Olympus and Helicon, a people whom
the later Greeks called "Thracians," a half-mythical race,
whose language has perished. They survived in memory,
it is told, as a race of bards, associated with that par-
ticular legendary poetry of pre-Homer date, in which
the powers of nature were first definitely personified.
This poetry belonged, presumably, to an age when the
ancestors of the Greeks had left their sensitive souls
with the voice of brook and tree and bird, and each agen-
cy of form which their senses perceived was personified
in connection with a system of worship. There were spirits
in every forest or mountain, but in Thrace alone dwelt
the Muses; the spirits who know and who remember, who
are the guardians of all wisdom, and who impart to their
disciples the knowledge and the skill to write.

Museums, in the language of Ancient Greece, were
the homes of the Muses. The first were in the groves of
Parnassus and Helicon, and later these were temples in
various parts of Helles. Soon, however, the meaning of
the word changed, and it was used to describe a place of
study, of a school.

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1 G. Brown Goode, The Museums of the Future (Washington,
Athenians in the second described Athens as "the museum of Greece," and the name was applied to that portion of the palace of Alexandria which was set apart for the study of sciences and which contained the famous Alexandrian library. The museums of Alexandria were a great university, the abiding plane of men of science and letters who were divided into many companies or colleges, for the support of each of which a handsome revenue was allotted.

The Alexandrian museums were burned in the days of Caesar and Aurelian, and the term museum, as applied to a great public institution, dropped out of use from the fourth to the seventeenth century. The disappearance of a word is an indication that the idea for which it stood had also fallen into disfavor, and such, indeed, was the fact.

The history of the museum and library runs in parallel lines. It was not until the development of the arts and sciences had taken place, until an extensive written literature had grown up, and a distinct literary and scientific class had been developed, that it was possible for the modern library and museum to come into existence. The museum of the present is more unlike its old-time representative, than is the library unlike its prototype.

There were, in the remote past, galleries of pictures
and sculptures as well as museums, so-called. Public collections of paintings and statuary were founded in Greece and Rome at a very early day. There was a gallery of paintings (Pinacotheca) in one of the marble halls of the Propylaeum at Athens, and in Rome there was a lavish public display of works of art.

The public men of Rome at a later period in history were no less mindful of the claims of art. They believed that the metropolis of a great nation should be adorned with all the best products of civilization. Pliny told that when Caesar was dictator, he purchased for 300,000 deniers (about $60,000) two Greek paintings which he caused to be publicly displayed, and that Agrippa placed many costly works of art in a hall which he built and bequeathed to the Roman people. Constantine gathered together in Constantinople the paintings and sculptures of the great masters so that the city before its destruction became a great museum like Rome.

Collections in natural history also undoubtedly existed, though there are no positive descriptions of them. Natural curiosities, of course, found their way into the private collections of monarchs, and were doubtless also in use for study among the savants in the Alexandrian museums. Aristotle, in the fourth century before Christ, had, it is said, an enormous grant of money for use
in his scientific researches, and Alexander the Great, his patron, "took care to send to him a great variety of zoological specimens, collected in the countries which he had subdued," and also, "placed at his disposal several thousand persons, who were occupied in hunting, fishing, and making observations which were necessary for completing his History of Animals." If human nature has not changed more than is supposed, Aristotle must have had a great museum of natural history.

When the Roman capital was removed to Byzantium, the arts and letters of Europe began to decline. The Church was unpropitious and the invasions of the northern barbarians destroyed everything. In 476, A. D., with the close of the Western Empire, began a period of intellectual torpidity which was to last for a thousand years. It was in Bagdad and Cordova that science and letters were next to be revived, and Africa was to surpass Europe in the exhibit of its libraries.

With the Renaissance came a period of new life for collectors. The churches of southern Europe became art galleries, and monarchs and noblemen and ecclesiastical dignitaries collected books, manuscripts, sculptures, pottery, and gems, forming the beginning of collections which have since grown into public museums. Some of these collections doubtless had their beginnings in the midst
of the Dark Ages within the walls of feudal castles or the larger monasteries, but their number was small, and these must have consisted chiefly of those objects so nearly akin to literature as especially to command attention of bookish men.

The idea of the great national museum of science and art was first worked out by Lord Bacon in his *New Atlantis*, a philosophical romance published at the close of the seventeenth century.

The first scientific museum actually founded was that begun at Oxford, in 1667, by Elias Ashmole, still known as the Ashmolean Museum, composed chiefly of natural history specimens collected by the botanists Tradescant, father and son, in Virginia and the north of Africa. Soon after, in 1753, the British Museum was established by act of Parliament, inspired by the will of Sir Hans Sloane, who dying in 1749, left to the nation his invaluable collection of books, manuscripts, and curiosities.

Many of the great national museums of Europe had their origin in the private collections of monarchs. France claims the honor of having been the first to change a royal into a national museum, when in 1789, the Louvre came into the possession of a republican government.

The intellectual life of America is so closely bound to that of England, that the revival of interest
in museums, and in popular education, at the middle of the nineteenth century, should be especially significant to America.

Until recently museums have been regarded by most people as vast store-houses of more or less useless, and often absurd, curiosities; or places where the public may lounge about listlessly on a wet Saturday afternoon, and become by degrees infinitely bored by their surroundings.

There are clearly three classes of persons whose interests in regard to museums are not merely distinct, but in some cases may be even opposed to one another. These are: (1) Students in the narrower sense; those, for instance, who are devoting themselves to some particular branch of art, industry, science, history, or archaeology. (2) The general public who are not expert students, but who desire to enlarge their stock of information, and to become interested in various departments of mental culture. (3) Classes of school-children of various ages and sorts; none of whom are necessarily excluded from museum influences. In regard, for example, to natural history, it is evident that the youngest children are capable of being

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highly interested in suitable exhibits, and of deriving therefrom much benefit. However, the scope of this study is limited to the treatment of the last group.

St. Louis gives a well-defined modern version of the museum. Bringing the world to the child is made possible by the educational museum, which is an integral part of the school system. The exhibits are not in glass cases under lock and key but the 150,000 articles, arranged in twelve thousand groups and collections, are in boxes, cases, glass jars, and bottles, ready at short notice to go to the schools. It is at work from morning till night every day of the school term, sending its material to the 3,000 schoolrooms, thus bringing the world to the schools.

The St. Louis museum is a traveling museum. The material is sent to the schools by large automobile trucks in the service of the museum. The schools are divided into five sections, each of which has a delivery day once a week. The teachers make a list of their needs for the week, from the catalogue, during the week.

III. MOTION PICTURES

The thing called a motion picture is not a picture

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in motion at all, but simply a series of still pictures which are projected successively. Psychologists say that the image on the retina of the eye remains there approximately one twelfth of a second after the picture really disappears from the field of vision. This phenomena is known as "persistence of vision" and it was first worked out scientifically by Korte.

This principle, however, has been known for three or four thousand years. Historical records show that the ancient Chinese had a device which produced the effects of motion perceptible to the eye. It was a darkened box with a peep-hole at one end and a square opening at the other end. Some artistic Chinaman had painted a series of similar pictures on a strip of silk so that Chinaman Number 1, who was looking through the peep-hole, saw a picture of action if the strip of silk was pulled across the opening at the proper speed by Chinaman Number 2.

Considerably later, yet a long time ago, Lucretius in his *Rerum Natura* wrote of "images that appear to move," about 65 B. C. and Ptolmey, the Greek philosopher, wrote a series of books on optics about 130 A. D., in which he spoke of the persistence of vision and described simple apparatus by means of which the phenomena might be observed.

Some see the dawn of the idea of motion pictures
in the nursery toy, "The Wheel of Life," invented, in 1833, by W. H. Horner, which proved quite popular in England and also in America, where it made its appearance ten years later. This consisted of a hollow cylinder with vertical slits cut into it and having representations on the inner surface. By turning the wheels the drawings or paintings of animals or people in different positions, seen in rapid succession, gave the idea of continuity of motion.

The first attempts to produce motion pictures were made by Leland Stanford late in the nineteenth century. His object though was to determine whether or not a certain horse lifted all four feet from the ground at any particular time while he was traveling around the race track. No motion picture camera had been developed as yet, so several still cameras were placed around a sector of the track and pictures were taken of the horse as he passed these points. This experiment was successful, but a young engineer by the name of Isaacs was given the job of devising an apparatus which would produce a continuous record of the horse's action. To him goes a great amount of credit for the recording of motion pictures.

However, Dr. Sellers invented a machine, the Kinematoscope, patented in 1861. He was the first to use photographs of real people in continued action and
to arrive at the conclusion that to obtain continuity of motion the picture should rest during the moment of vision. This is the principle of the intermittent movement, used today in both motion picture cameras and projectors.

Muybridge invented a machine, the Zoopraxoscope, which projected "moving" pictures on a screen, thus enabling a number of persons to watch the results simultaneously.

In 1882, Dr. Marey announced the invention of a "photographic gun," the first camera capable of taking, through a single lens, the number of exposures per second requisite for recreating the illusion of motion when projected.

Motion pictures may be said to have been formally presented to the American public at the Chicago World's Fair in 1893. All during the "gay '90's" motion pictures were presented to the public in the form of "Penny Arcades" and "Nickelodeons," which were only a box into which Mr., Mrs., or Miss Public peered and turned a crank for the consideration of the specified penny or nickel. Soon after the films were lengthened and presented in a darkened building to several people at once. The first motion picture show made its debut in New York City in 1896.

It is most significant however, that Muybridge's experiments, which mark the real beginning of motion
pictures, were scientific in character and results. The first use of motion pictures, by the founder of the art, was in education.

Many of the early scientists employed the cinema in research work and original investigations, with most satisfying results. Educators and men of sciences have instinctively turned to motion pictures for aid in teaching and demonstration. Continually, has the educational use of the cinema been slowly evolving. The Federal Government was among the first to utilize motion pictures on an extended scale for instruction.

Perhaps the first creditable move in the direction of education was made by Yale University when it began the production of the Chronicles of American Photoplays. These pictures remain the finest historical subjects ever produced and are used extensively by schools throughout the United States.

There ensued a period of liberal use of motion pictures for instruction from 1914 to 1920, but this was followed by a decided slump. The use of films for instruction has been reinstated in only relatively few of the many schools in the United States in the last seven to ten years.

During this revival of the motion picture, the sound film has been developed and improved. The sound film is the silent film from which the explanatory titles have been
deleted and to which has been added synchronized sound.
The first sound films were of the "Vitaphone" type. In this type, the sound was recorded on an acetate or aluminum disc which had to be synchronized with the picture on the film. Later, however, the sound was recorded directly on the film in a small place between the picture and the sprocket holes on the 35 mm film and in place of the right row of sprocket holes on the 16 mm film.

IV. STILL PICTURES

Photography is the child of optics and chemistry. As neither of these sciences attained anything like a full development until the last century, it is not surprising that the art of photography was unknown to one's ancestors. And yet there are many facts that must have been known, even to the ancients, whose meaning, if rightly appreciated, would have led to the early discovery of the art of photography. For example, lenses are all but absolutely necessary to the taking of photographs, and a lens has been found among ruins of Nineveh, a city which was destroyed more than a thousand years before the birth of Christ. This lens is now in the British Museum. During the Middle Ages the manufacture and properties of simple lenses were well understood in Europe.

The changes produced by the action of light upon matter are so common as to be matters of every-day observation. At a very early stage of civilization the tanning or bronzing of the human skin by the solar rays must have been noticed, even if the black skin of the negro was not assigned to its true cause, a constant residence beneath the intense rays of a tropical sun. A hundred years before Christ, the Roman Philosopher, Pliny, noticed and recorded the fact that yellow wax is bleached by exposure to sunlight. The Greeks knew well that certain gems, the opal and the amethyst more especially, lost their luster from the same cause; while the great Roman architect and painter, Vitruvius, was so conscious of the decolorizing effect of sunlight that he invariably placed his paintings in rooms facing the north.

During the seventeenth and eighteenth centuries many instances were recorded of the effect of light in changing the color of bodies; but, as the result is most rapid and most striking in the case of compounds of silver, it was to these that attention appears to have been chiefly directed.

In 1727, J. H. Schulze actually obtained copies of writing by placing the written characters upon a level surface previously prepared with a mixture of chalk and silver-nitrate solution. The rays of sunlight passing
through the translucent paper blackened the silver compound beneath, except where it was protected by the ink forming the letters, and thus a white copy upon a black ground was obtained. Although one cannot, on the strength of this experiment, assign to Schulze the title which Dr. Elder claims for him as the "discoverer of photography," yet it must be admitted that the experiment was a very remarkable one, and it is much to be regretted that it was not successfully and quickly followed up.

Even though some of the principles of photography were discovered as early as 1600, there was scarcely any progress in developing the art until 1777, when the Swedish chemist, Scheele, after numerous experiments, found a rather successful photographic plate.

Even though it was the close of the eighteenth century before anyone, with the exception, perhaps, of Schulze, seems to have thought of applying the changes of color produced by the action of light upon silver compounds to any practical purpose, the instrument called the camera obscura had been known, and those who gazed upon the beautiful pictures produced by its agency must often have longed to find some method by which they might be fixed and retained. Invented by the Italian philosopher, Bapista Porta, about the middle of the sixteenth century, the camera obscura at first consisted simply, as its name implies, of a
darkened room to which light was admitted only through a single small hole in the window-shutter. In such a room, when the sun was shining brightly, a faint inverted image of external objects as the houses, trees, et cetera, upon which the window looked, was seen upon the white surface of the wall or screen within the room which faced the window. Porta improved this contrivance by placing a double convex glass lens in the aperture of the shutter, outside which a mirror was placed to receive the rays of light and reflect them through the lens. The image upon the screen within was made brighter and more distinct, and was moreover shown in a natural or erect position. Crowds flocked to Porta's house in Naples to see these pictures painted by light, glowing with color, and depicted with marvelous accuracy. Soon further improvements were made, and the camera obscura became a favorite adjunct to the country houses of the wealthy, often taking the form of a small circular building, erected if possible on a hilltop. The lenses were then usually placed in the center of a conical roof, with a slanting mirror arranged so as to reflect the light from surrounding objects downward through the lenses; the picture thus formed was received upon the whitened surface of a table placed within the little building. Such erections are still not uncommon in places of popular out-door resort, and interesting
discoveries are not unfrequently made by those who have gained admittance, as to the doings of unsuspecting outsiders, who little think that their proceedings are pictured for the delectation of others.

The discovery of photography, altogether or in part, has been claimed for several men, who attained distinction in science towards the end of the eighteenth century. It has been stated that Professor Charles, who was well known in Paris as a lecturer on chemistry and physics about the year 1780, not uncommonly (as a lecture experiment) obtained profiles of the heads of his students by placing them so that the required shadow of the features was cast by a strong beam of sunlight upon a sheet of paper coated with chloride of silver. As the light would discolor that portion of the paper upon which it fell, the result was a white outline of the face upon a black background. But this statement is a mere tradition, and the best authorities have considered it "too vague and improbable to be taken into serious account."

The first man to obtain a permanent photograph was Joseph Nicephore Niepce. It was apparently, about the year 1813, that Niepce began the experiments which resulted in his discovery of what may be called the bitumen process in photography. Soon after he visited his brother, Claude, who lived in England, and took with him many
specimens of his work. These pictures, the first permanent photographs ever produced, Niepce desired to bring before the notice of the Royal Society, but as he declined to publish the process by which these were produced (being desirous to perfect it before making in public) the rules of the society compelled them to refuse Niepce's communication. Having examined several of the specimens presented by the early French experimenter to his English friends, they testified to the successful manner in which he had succeeded in copying engravings.

Making but a short stay in England, Niepce returned to France, where, in 1829, he entered into a partnership with another investigator named Daguerre. But Niepce was not destined to complete his work, or even to publish his results; he died in 1833, at the age of sixty-eight years. Although it is impossible to assign the title of "Inventor of Photography" to any one man, yet Niepce has probably the best claim to it.

Niepce was a man of quiet and retiring disposition; a student who was so immersed in his work and so desirous of making it, that he hesitated, while as yet he felt it to be incomplete, to publish even the smallest details with regard to it.

But the man with whom Niepce entered into partnership, Louis Jacques Mande Daguerre, was of a very opposite
temperament, bold and energetic, desirous of fame and its accompanying rewards, accustomed to success and to the applause of the public.

In 1822, Daguerre opened a diorama in Paris, for which he executed paintings on a colossal scale for such scenery as the "Village of Goldaw," and the "Valley of Sarnen," et cetera. But painting on both sides of the canvas, and showing the picture first by reflected and then by transmitted light, very remarkable changes and effects could be produced.

In the sketches from nature which Daguerre made as a preliminary aid to the execution of these immense pictures, he frequently employed the camera obscura; and it was the remarkable beauty and perfection of the images produced by this instrument that determined the artist to attempt the discovery of some means by which they could be permanently retained.

Year after year passed away and left the scene-painter still toiling after his ideal, ever endeavoring to fix the fleeting images formed by the lens of his camera. His ordinary work was neglected, but he passed nine tenths of his time in his laboratory. It was at this period that Madame Daguerre sought advice as to the sanity of her husband, and was not, perhaps, much comforted by the assurance of the men of science whom
she consulted that the object of her husband's researches was "not absolutely impossible!" Five years after the death of his partner, Niepce, he was able to announce that he had overcome all difficulties, and that henceforth, nature would depict her own likeness with a pencil of light. In 1838, Daguerre attempted to form a company which should acquire the work of the new process; but the Parisian public was utterly incredulous and the shares were not taken up. In the extremity Daguerre showed his specimens, and in confidence, explained his method to the eminent French astronomer and physicist, Arago. Arago's admiration and delight with this new and wonderful process by which objects were made to draw their own pictures were unbounded. As a man of science, and of world-wide reputation, his endorsement of the value of Daguerre's discovery at once established its worth, and on his recommendation the French Government awarded to Daguerre a life pension of 6,000 francs and to Isidore Niepce, wife of the deceased partner, one of 4,000 francs per annum, on the consideration that the invention would be published without patenting it; the money being paid by France for "the glory of endowing the world of science and of art with one of the most surprising discoveries that honor their native land." Notwithstanding this official statement, a patent was taken out by Daguerre in one country, England, in 1839.
Daguerre is said to have placed a written account of his process in the hands of Arago in January, 1839, and at the same time to have publicly exhibited specimens of the results which he had up to that time obtained; but no details were revealed, nor was the paper published until the meeting of the Academy in August of that year. The new process was named Daguerrotype, and the excitable inhabitants of the French metropolis went into ecstasies over it. Nevertheless, the Daguerrotype process was at the time of its publication, very imperfect, and it was destined to undergo important modifications and improvements during the next three or four years.

Talbot patented his calotype (beautiful picture) process in February, 1841. It was the third British patent for photography, the two previous ones being for the Daguerrotype process. The calotype process was also frequently called the Talbotype, in honor of the discoverer. The patent was afterwards disputed in the law courts on the ground of its "previous discovery" by the Reverend J. E. Reade; but it was upheld by the judge mainly for the reason that Reade did not properly publish or make known his discovery.

Niepce found that in the pictures obtained on his resinized plates, the lights and shade were just the reverse of those of nature; the whitest parts of the original objects
being represented by the dark surface of the insoluble parts of the bitumen, while the shadows were indicated by the bared surface of the metal plate. In the same way Talbot found the brightest parts of any landscape represented by black patches of reduced silver upon the sensitive paper, while those parts of the paper upon which little light fell (dark shadows, et cetera, of the landscape) remained white. Thus the developed image upon a sheet of calotype paper was the exact reverse, as far as light and shade were concerned, of the objects depicted. To such a picture Sir John Herschel, in 1841, applied the name of "negative." But paper is a semi-transparent substance, and by oiling or waxing it, its transparency can be greatly increased. This fact, combined with the reverse nature of the original, enabled Talbot to obtain true copies of any negative, by placing a piece of sensitive paper underneath the negative, and then exposing it to sunlight. The rays of light passing through the clear or transparent parts of the negative, blackened the paper beneath. After a sufficient time had elapsed the lower sheet of paper was removed, and it was then found to present a correct picture in black and white of the original objects. To such a copy Herschel applied the name of "positive." It is obvious that in this way any number of positives could be obtained from a single negative, and in this respect the
calotype process had a great advantage over the Daguerrotype.

In 1847, an American investigator named Maynard (of Boston) showed that when soluble pyroxyline was dissolved in a mixture of ether and alcohol, a somewhat viscid liquid was produced, to which he gave the name collodion. When this collodion was poured out upon a level surface, as that of a sheet of glass, the ether quickly evaporated and a delicate skin or film was left behind. When dry this film was fairly tough and horny. Collodion formed so admirable a covering for bruises, et cetera, preventing the access of air, that it speedily became of use in surgery.

Scott Archer, on attaining manhood, had become a sculptor. It is said that his early attempts at photography, by the calotype method, about 1847, were stimulated by his desire to employ the art to secure mementos of the production of his chisel. In September, 1850, Archer's new process was so far advanced that he communicated it to his friends among whom were Dr. H. W. Diamond, Mr. P. W. Fly, and others, from whom he received much assistance. Probably Archer did not realize the importance of his discovery, collodion, for he did not attempt to patent it; although, in 1855, he patented a method of removing the collodion film from glass plates by coating it with gutta-percha, an improvement which had little or no practical value. So good and complete was Archer's method that
in three or four years it practically displaced both the calotype and Daguerrotype, and then reigned supreme from 1855 to 1880.

A process which found great favor, and which was practiced for many years, was published in 1855, by the French scientist, Dr. J. M. Taupenot. It was in fact the first dry-plate process of practical utility. As first published, Taupenot's method was to take the collodionized and sensitized plate, pour over it a solution of iodized albumen, and allow it to drain and dry; the plate was then dipped a second time into a silver nitrate bath, again washed, and finally dried. This double process was thought rather tedious, but the plates so prepared would keep for weeks or months.

Up to about 1853 a photograph was considered a curiosity; but the introduction and perfection of the collodion process made photography for the first time, a really popular pursuit. With mistaken ideas as to the ease of the new method, large numbers of amateurs purchased the necessary materials, and about 1858, the camera became as common an object as the barrel organ.

But with the practice of photography came the sad knowledge that there is no royal road to the taking of good pictures. Although money might be lavishly spent in the purchase of costly apparatus, yet it was soon found
that some knowledge of chemistry, and some artistic taste, together with accuracy in working, were indispensable to success. Moreover, the chemicals employed, more especially the silver nitrate, had ways of marking the apprentice to photography. Stains of inky darkness upon the hands and clothes soon earned for the infant science the appellation of the "black art."

The introduction of gelatine, as a means whereby the sensitive salts of silver could be retained upon a plane surface of glass or paper, followed quickly upon the publication of the "albumen-on-glass" process, discovered by Niepce de St. Victor, in 1848. In Gustave Le Gray's book, translated into English in 1850, he mentions the use of gelatine for such a purpose, the support being coated with iodized gelatine, dried, and then sensitized by immersion in a bath of silver nitrate in the same way as collodion. The gelatine, however, was found to swell or even dissolve in the silver bath. In Germany, Dr. Halleur obtained beautiful images on similarly prepared plates, but then quickly disappeared, a result probably due to the acetic acid (in which gelatine is soluble), then used as an ingredient of the developer.

In 1861, Gaudin used gelatine as one of the substances with which he prepared his "photogene" the forerunner of emulsion photography.
Poitevin who had long used gelatine in his printing process, showed, in 1862, how "dry plates with the bath" could be prepared with it. A curious feature of this method was that bichromate of potash was mixed with the gelatine, after which the plates, coated with the mixture, were exposed to light; then the bichromate reacted upon the gelatine and prevented it from creasing in the water during the subsequent operations.

From what has been written it will be seen that the progress which has been achieved in photography during the brief century of its existence has been mainly in the direction of rapidity. It is not so much that better photographs are taken in modern times than in 1839, as that one takes these in a fraction of the time then required. The following table shows this very clearly.

### TABLE I
PROGRESS IN PHOTOGRAPHY

<table>
<thead>
<tr>
<th>Process</th>
<th>Date of Discovery</th>
<th>Time Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heliography</td>
<td>1827</td>
<td>6 hours</td>
</tr>
<tr>
<td>Daguerreotype</td>
<td>1839</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Calotype</td>
<td>1841</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Collodion (Wet)</td>
<td>1851</td>
<td>10 seconds</td>
</tr>
<tr>
<td>Collodion (Dry)</td>
<td>1864</td>
<td>15 seconds</td>
</tr>
<tr>
<td>Gelatine Emulsion</td>
<td>1878</td>
<td>1 second</td>
</tr>
<tr>
<td>Orthochromatic Emulsions</td>
<td>1911</td>
<td>1/25 second</td>
</tr>
<tr>
<td>Panchromatic Emulsions</td>
<td>1922</td>
<td>1/100 second</td>
</tr>
<tr>
<td>Supersensitized</td>
<td>1938</td>
<td>1/1000 second</td>
</tr>
<tr>
<td>Panchromatic Emulsions</td>
<td></td>
<td>and faster</td>
</tr>
</tbody>
</table>
Before it became possible to use photography in conjunction with the lantern, what are called hand-painted slides had to be depended upon, for these were the sole pictures that could be obtained. In those days it was common to use a very much larger picture for the lantern than at present. Those pictures which delighted one or two generations of sightseers at the old Royal Polytechnic Institution, measured about eight inches by five inches. Some of these pictures were most elaborate works of art.

From approximately the time that Talbot first succeeded making "positives" from his calotype "negatives," lantern slides were made from photographic negatives in much the same manner. The types of emulsions used for lantern-slide plates have followed very closely the history of the photographic plate and film. In fact the lantern-slide plate can be used as a photographic plate if time is no obstacle.

With the advent of the thirty-five millimeter cameras and films, came also the positive transparencies which became known as film-strips. These strips were also cut into individual pictures and called miniature (two inches square) slides, since the regular slide is three

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and one fourth inches by four inches. About 1932, phonograph recordings were incorporated with the film-strip and then called the sound-film-strip.

V. GRAPHIC MATERIALS

The history of cartooning and caricature would date to prehistoric times. In ancient remains and in medieval manuscripts are found drawings lampooning the foibles of man and especially of the great and the pretentious. The medium political social cartoon is, however, a product of the last century. Andrew Jackson was one of the first subjects of political caricature. Probably the most famous political cartoons of all times were those of Thomas Nast against the Tweed Ring which ran the government of the city of New York for its own profit in the 1890's. Nast's work marks the beginning of the modern period of cartooning, and many of his inventions, the Tammany tiger, the Republican elephant, the Democratic donkey, have become standard symbols. Nast's cartoons, like those of his great contemporary, Joseph Keppler, the founder of "Puck," and most others of the nineteenth century were personal and, although rightly so, often abusive. This tradition still influences American cartoonists for there are probably more cartoons drawn concerning personalities than
concerning abstract ideas.

The influence of the cartoon in the formation of public opinion is undoubtedly considerable. The compactness of presentation, the simplification of issues necessitated by the limits of the drawing, and the interest provoking humor draws the attention of the persons who will not trouble themselves to read long editorials. The cartoonist can dare to say truths that the editor will shun because of the convention that he is a jester and not to be taken seriously.

Ever since records were first kept, man has been confronted with the problem of the interpretation of numerical data. The preparation of tables was a great step towards facilitating the analysis of figures. However, the graph, which converts into a visual form for a comparison of various quantities, met just such a need of a more satisfactory means by which the significance of data could be quickly, clearly, and easily understood. William Playfair, the first to graphically portray economic data, in 1786, said, "What I have succeeded in proposing, a new and useful mode of stating accounts, has so generally been recognized. As much information

3 Lawrence F. Shaffer, Children's Interpretations of Cartoons (New York: Teacher's College, Columbia University, 1930), p. 2.
may be obtained in five minutes as would require whole
days to imprint on the memory in a lasting manner, by a
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In 1637, Rene Descartes described for the first
time the principle on which the modern graph is based.
Through the use of lines drawn perpendicular to one
another he was able to represent the values of pairs of
numbers by the use of points on the resulting plane.

The primary purpose of the graph is to present
numerical data in visual form. With the growth of its
use in numerous fields of endeavor, the functions of the
graph have multiplied. It serves as a means of presenting,
visually, tables of statistics in a simple, readable, and
interesting form. The graph also makes clear undiscernible
facts, such as correlations, which might be overlooked in		

Herbert Arkin and Raymond R. Colton, Graphs: How
to Make and Use Them (New York: Harpers and Brothers
Publishers, 1936), p. 1
CHAPTER VI

THE DEVELOPMENT OF VISUAL EDUCATION

The use of visual aids as a method of instruction has developed remarkably in the past few years until it has become conclusively evident that these aids are to be important as well as essential methods in school work, and in the future no well equipped and efficient school will be without the necessary projection machinery and other mechanical aids and an adequate appropriation to supply the necessary films, stereographs, flat pictures, and other such materials to correlate with class work.

For several years the Metropolitan Museum of Art has been producing and distributing (free to New York City public schools) films on various phases and periods of art, which are for the most part represented in the museum collections. Recently completed was "Wayne Adams" and now in production are films on American architecture and a "Visit to the Museum."

The "Model in Motion" is a series of films used for drawing purposes, and originally developed in this country by M. Charles Woodbury and Elizabeth W. Perkins

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of Boston. In each quarter-reel, a model performs the
round of some action again and again. Pupils make drawings
while the film is moving, or from memory directly afterward.
The sense of action and training in observation are the
goals sought in such use.

In 1930, President Robert M. Huchens announced a
new educational plan for the University of Chicago. The
College part of this program representing many years of
work by members of the Faculty of the University of Chicago
and consummated under the leadership of President Huchens
was put in operation in the Fall of 1931.

The pictures have been produced with the coopera­
tion of Erpi Picture Consultants, Incorporated. These are
correlated with the printed syllabi and textbooks which
have been prepared for the general courses in the college.
Eighty talking pictures have been planned, twenty pictures
in each of the university's four general divisional fields,
the biological sciences, the humanities, the physical
sciences, and the social sciences.

The advantage of such pictures are many. A ten­
minute film presentation can demonstrate clearly many
natural processes requiring days, weeks, months, and years.

2 Chauncey S. Boucher, "Talking Motion Pictures in
the University of Chicago's New Educational Plan," Edu­
cation, Volume, 53, 1933, p. 328.
For example, such phenomena as the development of deltas, a river digging a new channel, the action of wind-blown sand on rock formation, can be portrayed vividly and accurately through time-lapse or slow-motion pictures which make visible movements imperceptible to the human eye.

Films obtained from a number of sources (Society of Visual Education, De Vry, Eastman, Ford, and others) are accompanied by a teacher's guide or a manual which gives helpful suggestions. While these do not have the value of a "home-made" guide, these are extremely helpful in that they outline the content of the film and usually give a list of references for the teacher and outside reading lists for the pupils. An improvement would be the addition of a new-type test which might be used partially or all in connection with the film.

It is true that a great deal has been accomplished with the motion picture. Many excellent films have been produced. But these films have not been adequate for the purpose of showing youth the problems that not only face them as individuals but are facing American civilization today. These films have been used too much as a device for improving the quality of human behavior.

Modern 16 mm. projectors, both silent and sound, are available at comparatively moderate cost. These
projectors are portable, compact, easy to operate, present no fire hazard, and are capable of giving results approaching theatrical quality. Such machines have in large measure eliminated the former mechanical handicaps of cumbersome unsatisfactory projectors, some of which required an able bodied contortionist for the threading operation alone.

It has long been felt that motion pictures might be used successfully as instruments of character education. Perhaps the chief difficulty has been the cost of preparing films for this purpose. The Committee on Social Values in Motion Pictures seem to have obviated this difficulty by a very simple plan. The Motion Picture Producers and Distributors of America have agreed to produce a number of one-reel films extracted from current feature plays. In these films, well known actors portray, vividly, situations involving basic social issues and character problems. The films are designed for use by schools, churches, and other social agencies. After viewing the films, it is expected that pupil and teacher, or other discussion leader, will discuss the problems portrayed. In this way it is hoped that pupils may be led to arrive at constructive conclusions of their own.
CHAPTER VII

THE USE OF VISUAL AIDS

It is hardly necessary to go outside the realm of daily experience to bring to mind the importance of the visual representation in forming lasting impressions. That which has been unusual and which has been seen clearly is remembered. The magazine, book, or newspaper which does not use pertinent and abundant illustrations is limited in circulation and popularity. For example, consider the rapid growth in circulation and the increasing popularity of such magazines as Life, Look, and Pic. Industry has found the motion picture, the slide, the photograph, and the chart to be highly successful in the training of men; in showing manufacturing processes; and in encouraging the public to purchase. The motion picture industry, itself, has been accused of affecting the daily life with a force exceeded only by the combined influence of the press and the radio.

Visual education in its broadest sense includes all learning in which seeing is involved. As the sense of sight is the main street, so to speak, over which impressions from the outside world reach the human brain, it is practically impossible to set boundaries for visual education.
The materials for use in learning through seeing are as limitless as the field these cover. Everything that meets the eye in the outside world is a potential architect of new or changed meanings in the inner world of the mind. What one sees may even give the cue to what one has learned in other ways. What one sees serves to interpret through another medium, ideas that are abstract and sometimes beyond the understanding of the individual. But although the possibilities of visual education are limitless, in actual practice learning through seeing is limited.

First, mere seeing is not learning or observing. Each one of several people looking at the same thing will receive impressions different from those of any other in the group. An artist's observation of a cornfield, for example, will be very different from that of a farmer's son, who had to plow the corn, or a city boy, who is seeing corn growing for the first time.

The visual education of each individual is limited by the powers of observation and by the particular interest and mental training of each individual. If one wishes

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children really to see certain things, he must give the children some indication of what to look for, remembering always that what each child sees has been passed through the filter of his personality and can never be identical with what another person sees.

A second limitation placed on the scope of visual education is the "selecting" of what is to be seen. There is no question "that visual materials are lying all around us waiting to be used." The point is that it is impossible to use all of them to supplement book learning or to motivate desirable practices. Visual materials must be selected from the mass for particular educative purposes, and the purposes are what will determine the use of the materials. The sun and the stars and the moon are visual education materials and how many ways there are of looking at them!

I. THE SCHOOL JOURNEY

By far the most effective visual aid available to classroom teachers is the school journey. By itself, the school journey is not really a visual aid, but a procedure by which objects and materials in their natural setting are made available to pupils for detailed study. Because it makes the real situation the learning situation, and because it takes the pupil to the functional reality, it is treated as a visual aid, although the things themselves,
not the journey, are the real visual aids.

In many ways, the school journey is the most valuable of the visual aids because it deals with real things in real situations. There is nothing abstract about it. If pupils are studying foods, or dairying, or health, they can visit a nearby dairy, in which they see the process of milking, the process of pasteurization, the process of bottling, the process of sanitation throughout the entire dairy, and the process by which the milk is distributed throughout the community. The children actually see cows milked, they see the milk actually treated with heat to free it from harmful bacteria, they see it actually put into bottles which have been thoroughly cleansed and made sanitary, and they see it actually distributed from the dairy to Mary's own front porch. Furthermore, there is a dairy within walking distance of most schools. The process is there in the concrete, awaiting inspection and study by the teacher and the pupils. Pasteurization then becomes much more than a long and difficult word in a book; it is something which people in the community do to milk obtained from cows from the nearby country, to prevent the people in the community from contracting typhoid fever as a result of drinking impure milk.

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No expensive or elaborate mechanical equipment is necessary for the school journey. One has merely to take the children out into the real world in which they and their parents and their friends live, to study the things that are very inadequately and very remotely conveyed to them through the words of the textbook or the words of the teacher. But like any worthwhile activity, it must be carefully planned, it must be skillfully directed, and it must be made to correlate with the curriculum and to contribute to the unit the pupils are learning. School journeys must not be confused with picnics of any kind.

II. MUSEUM MATERIALS

The best explanation and suggestions concerning the use of museum materials (objects, specimens, and models) is found in Dr. Hoban’s monograph on *Visual Education and the School Journey*.

The object is the thing itself, plant, fruit, vegetable, bird, animal, et cetera, that can be brought into the classroom for study. The specimen is a sample, a part intended to show quality, one of the several things which

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represents all; for example, a piece of coal, wood, cloth, et cetera. The model is a small-size representation, as for example a building, engine, heart, lungs, globe, et cetera.

The best place to study cotton would be at a cotton plantation, but the cotton plantation is not available to all school children in the form of a school journey. The cotton plant, however, with its flower and fruitage, can be brought into the classroom where the children, in addition to seeing its arrangement in the boll, can handle the cotton, feel the fibers, pick out the seeds, go through the process of combing it and twisting it into strands. This exercise, supplemented with photographic materials or even a motion picture, showing the cotton field, the method of planting, the stages of growth and cultivation, the negroes picking cotton, and the processes through which the cotton passes from then to the manufactured garment, will enable the child to understand the relationship between cotton as a plant and as a useful commodity.

Pages are required to set forth the principles of an engine or motor. The miniature model, amplified with pictorial material, gives a correct representation of the thing which enables the pupils to see the relationship of its various parts. One too often takes a considerable period of time to describe verbally or through the printed
page a relationship which could be portrayed more accurately and vividly in a half or a quarter of the time by means of the natural setting (through pictures or motion pictures), object, specimen, or model. Only actual tests of the use of these aids are needed to convince the teacher of their value.

This visual aid is peculiarly adapted to the teaching of health. In teaching history, for example, the teacher does not need to have a historical face. The people who have faces capable of sinking a thousand ships do not teach history; they make it. But there is no doubt that in teaching the principles of healthful living it is highly desirable for the teacher to look healthy and to be healthy. He becomes an exhibit of what to look like and how to behave, and what not to look like and how not to behave which is more effective than anything he may say. If a teacher tells his pupils not to put their fingers in their mouths and then absent-mindedly moistens his own fingers with his lips in order to turn the pages of a book, no scientific study will be needed to indicate which will be more effective; what the teacher said or what the pupils saw him do.

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There is no question but that certain factors in the pupil's environment may detract from health teaching by giving them eye-witness evidence of the fact that precept and practice may live in a state of separation if not complete divorce. For example, many a teacher has been obliged to resort to makeshifts in his endeavor to teach children to wash their hands before eating and after visiting the toilet because there were no hand-washing facilities in the school. The perfect visual education material for teaching the practice of handwashing is the sight of warm running water, soap, and individual towels in the washroom. Lacking these in a school where children eat their lunches of what possible use is it for the teacher to say: "Always wash your hands with warm water and soap before eating." All other visual education materials, such as bacterial cultures from dirty fingers grown by the children themselves on agar or gelatine media, become insignificant if the children are permitted to see "with their own eyes" that the handwashing facilities in school are either lacking or inadequate.

To encourage creative ability among young people and at the same time to develop an appreciation of modern health practices, the building of health museums by children as a part of their school work is being recommended. These will require the cooperation of all school departments,
creativity on the part of the pupils, and continuous growth in the quality of the exhibits in order to maintain high educational standards.

III. MOTION PICTURES

The possibility of broadening the experiential background of school children through contact with life situations in the school journey and with the things and processes of life in the school museum has been indicated previously. But the world is still too large for every child to come in direct contact with all its interesting and vital situations, and the school is too small to house the significant parts and representations that can be brought to the school. The school journey and the school museum have their limitations as well as their advantages.

Professor Mark Van Doren of Columbia University, has been quoted as saying that motion pictures should have but one purpose, entertainment. Every teacher knows that they mean much more. They entertain, to be sure; but while they are entertaining, they are teaching, developing attitudes, arousing emotions, and otherwise laying foundations for future patterns of thought and action.

Obviously, all motion pictures have educational values, if education is thought of in terms of the Deweyan philosophy that education is life experience. Such a broad conception of an educational motion picture, however,
is confusing since it does not distinguish between the pedagogical film and other cinema products. For many laymen, and even to some educators, the term "educational film" is synonymous with the trade name of a theatrical product, or with any motion picture which does not follow the Hollywood run-of-the-mill procedure. Therefore, it seems desirable to emphasize that, while all films may be educational to some quantitative or qualitative degree, not all films educate or teach curriculum concepts, directly, or capitalize on the many advantages of the motion picture medium for the presentation of concepts difficult to communicate by other media of thought transmission.

At one time, as with anything new, extravagant claims were made for the use of motion pictures. It was said that they should supplant the textbook, possibly eliminate a great number of teachers, and thereby speed up the whole educative process. Results to date have not verified these claims.

In using the motion picture in teaching, it must be borne in mind that the teaching film as an educational agency is new. There are in circulation many films classified as educational which were not designed primarily

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5 H. A. Gray, "Instructional Sound Film Utilization," The Educational Screen (Chicago: Educational Screen, Inc., 1939), Volume 18, Number 1, p. 27.
for classroom use. The teacher will need to use care in selecting those films which best furnish learning experiences and which will aid in the accomplishment of the major objectives of his work.

In considering how the instructional film can be used most advantageously, the problem may be thought of from two viewpoints: (1) How can the film vitalize the curriculum concepts previously studied, those being developed, or those about to be initiated in the regular instruction program; and (2) How can the medium be used to best advantage on a purely experimental basis conditions permitting individual teachers to engage in such activities and to extend the knowledge of learning phenomena.

Relative to the first viewpoint, the instructional sound-film has been found to have definite value for the purpose of summarizing a unit of instruction; it obviously has a contribution to render as a direct teaching aid by making available classroom learning experiences of a realistic nature difficult or impossible to provide by other means; it also serves as an interest motivating device for introducing a new unit of instruction and as a means of enriching a unit of study by opening up related areas for the pupils' investigation. Other uses to which it may be put are: (1) Extra-curricular activities
including club work and other special projects. (2) Professional activities such as demonstration lessons and Parent-Teacher programs to acquaint the community with the effective use of modern teaching aids. These possibilities offer innumerable opportunities for the teacher to adapt a particular film to local needs and to do creative work with the medium.

To realize the values inherent in a sound film, prepared for instructional purposes, the teacher should plan in detail for its use. Attention should be given to adapting the content of the film to the current interests, needs, and abilities of the class; how the idea of the film showing can be built up to put the pupils in a receptive mind for its initial viewing; how additional showings may be arranged to answer questions which have arisen from study activities initiated as a result of the first showing; in general, how the film can motivate learning throughout the span of a unit's work. To do these things adequately requires careful study of the content of the unit of instruction and the relation of the film to that subject matter. The latter can be done only by carefully studying the film, prior to its viewing by the class, either by previewing the picture or by studying a scene by scene description of its continuity.

An examination of any motion picture in the light
of these principles is illuminating. Select at random any film and test it by proposed standards. Generally, it satisfies the first criterion reasonably well. Motion pictures usually present material which is sufficiently novel to a child's "native interests."

Too often, however, little attempt is made to meet the second criterion by creating a problem in the mind of the observer. A perusal of even the best of the modern films reveals a decided deficiency in this direction. The opening scenes of the Eastman film, "Peanuts," shows a man

...plowing a field with a disc harrow pulled by a tractor. A machine is seen distributing lime over the soil so the peanuts will grow shells. Scenes show colored workers picking peanuts and later shelling by hand those which are used for seed. Scenes of a planting machine in operation are followed by an animated picture showing the growth of peanuts underground.

The above description constitutes Unit I of the film. Undoubtedly there are problems that may be developed from this section of the film, but these are not obviously implicit in the subject matter of the pictures. If this is typical, the teacher will need to create his own setting for the film in many, and perhaps in most,

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This discussion is not intended to discourage the use of motion picture. The educational film is a real teaching device, whose worth is not to be gainsaid. The above considerations do indicate, however, that it is unwise to plunge headlong into an indiscriminate use of motion pictures in the classroom.

In introducing motion pictures, the teacher should progress slowly and cautiously. It is best to show only a few the first year, previewing each one and noting the leading themes and the problems suggested. An additional preparatory activity may be the listing of reference readings for use in connection with the film. The teacher can familiarize himself with the subject matter of the film by this additional reading and may also develop a test based on the film. A very helpful set of materials can thus be developed.

At this time the writer has deemed it apropos to present one of the many lists of standard for evaluating educational films.

**PROPOSED STANDARDS FOR EVALUATING INSTRUCTIONAL FILMS**

By Joseph J. Weber

General Standards: Does the film, in a satisfying
and economical manner, effect learning that is worthwhile?

More in Detail

1. Does the film appeal to socially approved native interests? Elements involved: personification, human beings, animals, young things; mysteries, novel, familiar sensational behavior; hero worship, struggle and success, et cetera. Things that attract human attention readily?

2. Does the film create a problem in the observer? Main problem--vital, gripping, interesting, whetting curiosity, stirring emotions, et cetera. Subordinate problems--complicating, relevant to, and building up the main problem. Solution--satisfaction in the solution of the subordinate problems, suspense, climax, and a solution to the main problem that leads to further mental activity.


4. Social Values: Is the topic depicted or illumined worth a place in the school curriculum?

5. Mechanics: Is the photography good? Is the arrangement of the continuity the best in its emphasis? Is the duration of the scenes sufficient for comprehension? Are the captions brief, clever, true? Is there a scientific word-picture balance? Is there an all-round approach to artistic perfection in matters pertaining to quality?

A possible standard to be added to the Weber score card is that the film should be short, preferably not to exceed one reel.

As a rule, interruptions should be infrequent during the showing of a film. An occasional stopping of a film to show and discuss a "still" is justifiable. Too frequent interruptions, however, tend to destroy the continuity
of the film story.

A discussion period may follow the presentation of the film. During this period children should be encouraged to express opinions, to raise leading questions, and to cite parallel experiences. Such a period provides an opportunity for clarifying ideas and for fixing correct impressions. Occasionally an informal test may follow the discussion period. This plan of procedure for the use of motion pictures will be a vital factor in destroying the passive attitude toward motion pictures which has been one of the main causes of criticism directed against the use of educational films in the classroom.

Professors Herman I. Schlesinger and Harvey B. Lemon, who supervised the production of some of the Chicago University films, have written a pamphlet which they call a Study Guide. This little book contains instructions for the pupil to assist him in gaining the greatest benefit from the film presentation. To quote:

In order to derive the greatest advantage from the film, the student should become thoroughly familiar with the introduction and the objectives before the film is shown.

Previously to the initial showing it is desirable to discuss the objectives and their relation to the study. After the picture has been shown, phenomena observed in specific scenes should be recalled and consideration given to the significance of those scenes to the sequences of which they were a part. The sequences of the picture also should be compared
with each other; for instance, the similarity between the phenomena associated with the burning of phosphorus and with the corrosion of iron may be developed. Such an analysis prepares the student more intelligently to view the picture the second time and give him the proper foundation for beginning the development of the subject.

This may be an opportune time to discuss topics not treated by the film, to relate individual scenes to what the student has already learned about the subject; to select specific problems to be studied; and to associate phenomena portrayed by the film with the student's every-day experience. The second showing should be given after progress has been made with classroom and laboratory work and need for the showing is evidenced.

Before the second showing, the student may find it helpful to prepare a list of unanswered questions or problems which were suggested by the first showing and have arisen in the subsequent study. The second projection of the film will undoubtedly answer many of his questions and will provoke additional questions and suggest further activities. At the conclusion, discussion will bring out the significance which certain scenes have for the activities in which the students are engaged. This will allow him to redirect his efforts and to seek assistance if necessary. It likewise will indicate what elements he should study during the subsequent showings of the film.

It is believed that a minimum of three showings is desirable to secure the best use of the film. The third showing should bring to a focus the student's ideas about the process or subject, and should add meaning to the activities which he has carried on during the study. As with the other showings, the student may note questions and should review the objectives. Group discussion following the third showing should bring about to a successful conclusion the study of the subject and should aid the student in preparing for whatever tests are to be undertaken.7

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The typical child enters Grade I when he is approximately six years of age. His primary senses and innate curiosity have permitted him to acquire some knowledge of his environment, and in accordance with his mental ability, such information has already shaped itself into concepts of varying nature and complexity. Because of his immaturity such concepts are limited in number, and some no doubt are erroneous, owing to the fragmentary nature of the visual and the auditory stimuli constituting his learning experiences.

Observation will have indicated that his hearing vocabulary developed long before he could talk. That is, early in infancy he acquired an understanding and an appreciation of spoken words much in advance of his ability to speak the words. Later in life when he could use words for asking questions, he became equipped with a powerful learning tool so that, by the time he reached Grade I, he was familiar, in a superficial way, with the nature and the relationships of many things in his immediate environment. He was not so well conditioned, however, to objects and relationships beyond the effective functioning of his limited learning facilities. The school,

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therefore, is supposed to equip him with learning tools, foremost of which is the ability to read, so that he may pursue the quest of finding out about the world and its ways.

At this time in life he meets an obstacle which too often holds up or retards his continued learning. Reference is made to the difficulty of learning to read and to the time required for him to develop the degree of reading ability necessary for acquiring further learning. It is fitting that consideration be given to how primary-grade teachers can use mechanical and other devices to increase the effectiveness of their efforts, how they can provide the child with meaningful learning experiences independent of reading ability and conventional teaching aids, particularly where such mechanical devices can increase the scope of the child's knowledge and understanding while concurrently serving as a means of facilitating the process of learning to read. Toward this end the sound motion picture has been drafted into service, and with its unique property of being able to reproduce when needed a multitude of realistic, dynamic learning experiences, it promises to surmount many barriers to human learning in general and to contribute materially to the education of beginning learners in particular.

The sound motion picture knows no geographical or
political boundaries. It can bring the world, so to speak, to the individual child and thus furnish him with authenti- tic learning materials, without which the kind and amount of his learning obviously are limited.

Seasonal limitations make up a second barrier to learning. Winter snows, spring rains, summer heat, and the chilly winds of autumn, each make it impossible for the child to have certain study materials or to engage in selected study activities. The sound film surmounts this difficulty by recording faithfully and reproducing on de- mand the elements of learning experiences independent of weather restrictions.

Children are slow to learn about a great many things in the world because of the limitations of the unaided hu- man eye. Even with normal vision, many things remain un- seen. Space prevents the child from seeing beyond his immediate horizon; density prevents him from peering into solid objects; size will not permit him to gaze into the kingdom of microorganisms; and actions and reactions oc- cur so slowly or so rapidly that he cannot see the proc- esses involved. To provide him with individual apparatus

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for overcoming these difficulties would require the expenditure of great sums of money. The sound motion picture, with its many technical advantages, not only increases this ability to see but can provide large classes with the same view of a situation at the same instant.

Similarly, the limitations of a child's sense of hearing restricts the type of learning that he can acquire. Most knowledge is in some way associated with sounds; if children can hear the sounds of a situation, this learning is made easier. Not only does the talking picture provide sounds of the ordinary world, but it can make available sounds not usually heard and thus provide additional association cues. Learning is further enriched by incidental sounds. Music or voice inflection, for instance, may be used to advantage to command the child's attention and arouse his curiosity. As with optic devices, apparatus for reinforcing the individual child's hearing ability can be acquired, but the sound film makes this acquisition unnecessary.

The restrictions of home and school conditions allow children to come into contact with but a small part of the world in which they live. They cannot travel extensively, inspect scattered industries, see and listen to celebrities, witness natural phenomena, or engage in many other learning activities necessary to obtain the
knowledge and the appreciations presented by one ten-minute reel of adequately treated audio-cinema material. The talking picture has the potential power of providing primary-grade children equalized educational opportunity never before realized in the history of education.

There is a great deal of wisdom in the ancient proverb, "One picture is worth a thousand words." It is probable that one picture will not provide as much confusion in the child's mind as would a thousand words. In addition to words the meaning of which are unknown to the child, there are so many shades of meaning in spoken or written language that verbal chaos easily can come into the learning problem.

Finally, the reading problem itself looms as a barrier to the young child's learning. Inadequate methods and materials, poor habit formation, and mental and physical defects account for most difficulties in beginning reading. Until the child learns to read, he is handicapped in his learning activities. By means of the advantages previously cited, which are made possible by the wonders of natural speed, ultra-rapid, time-lapse, animated, trick, X-ray, and telescopic photography, and by the use of intrinsic and incidental sounds, together with carefully prepared comments synchronized with attention-commanding devices and the action of the picture, the instructional
sound film can provide the young child with learning experiences which are independent of reading ability. This does not mean that children should not be taught to read or that the teacher should cease to give attention to reading disability; it means that audio-visual teaching aids should be utilized to enrich the child's supply of general and specific knowledge, which in turn can motivate interest in learning to read, and that these aids should be made an integral part of subsequent reading activities. Because of its universal appeal, the sound motion picture has great promise of becoming a powerful ally of the primary-grade teacher.

A straightforward intellectual exposition of the history of medicine may leave one unmoved, but "The Story of Louis Pasteur" prompted one group of fourth-grade and fifth-grade children to say: "It was the most interesting thing we did in school this year." It caused a dull eighth-grade boy to make the very profound remark: "Civilization is slow, isn't it?"

The motion picture may be used in place of demonstrations to show experiments which ordinarily take much expensive apparatus and many hours to set up. Such famous experiments as Michelson's determination of the speed of light can be brought into the classroom through this medium. By using animated drawings many forms of experiments
may be clarified by focusing the attention of the pupil upon the important processes involved. For example, pictures dealing with electrical phenomena may illustrate through animated cartoons the action of a transformer by tracing the flow of electrons in association with the magnetic fields. In addition, the size of the motion picture on the screen enables the focusing of attention upon important details which in a lecture demonstration would be lost to all but the fortunate few who are within close view of the instructor's demonstration desk.

A great master of science can conduct an experiment for reproductive purposes with elaborate and expensive equipment so clearly that pupils may be instructed with resulting films without the hazard of changing conditions which may cause the failure of a delicate and costly laboratory equipment. A telescopic lens will bring distant objects prominently on the screen. This is invaluable in the study of the solar system. The microscopic lens will enlarge minute living and moving organisms to the size best adapted for study and will show actual physical changes taking place. X-ray photography will make possible the observation and demonstration of processes.
within opaque objects. Just as motion pictures taken slowly and projected rapidly or vice versa, make visible things the human eye cannot see so does the sound record of perfectly synchronized speech enable this material to be presented with an effectiveness and emphasis often lost by many but the most skillful lecturers. Sound amplification can often be used so that inaudible sounds can be clearly heard. The pupil cannot obtain such experiences and the subsequent knowledge obtained from them by any other method.

Constructive thinkers pointed out that the power of the motion picture could be used to develop attitudes and behavior in keeping with educational objectives as effectively as it could be used to destroy them. It became apparent that the motion picture could not be ignored any longer and now educators in the high places of importance and influence are belatedly determined to harness this great force in modern life to the needs of the school.

The earlier studies of the influence of motion pictures upon the acquisition of information prepared the Payne Fund group to expect to find that the motion

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11 F. Dean McClusky, "Will the Film and School Join Hands?" *Education*, Volume 58, 1938, p. 452.
picture has a powerful educational influence. Particularly the studies of Freeman and Wood presented evidence of their potency in the classroom. But these studies did not prepare the group for the evidences of the breadth of this influence nor completely for the power which they found.

One might describe in some detail the motion pictures' potentialities as a medium for imparting facts. It could be shown, with some wealth of illustration, the radical manner in which behavior patterns of children are modified for good or bad by viewing the pictures of the commercial theatre. It would be possible to present facts about the effect of films upon the emotions of children. But this discussion is confined to the effect of motion pictures upon the attitudes and points of view of children.

That attitudes toward significant objects in social life are important and even crucial needs little elaboration. If a nation wishes to win a war, its people must be in favor of war. If a community wishes to stamp out crime, bootlegging, racketeering, it is necessary that the key men as well as the mass of the citizenry be strongly opposed to crime. No social enterprise can succeed unless the community's attitude is favorable. The philosophy

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of the group must be in harmony with the movement.

Nor can one expect an individual to order his life in directions other than toward those aims which he favors and against those which run counter to his philosophy of life. If a man favors smart practices in business, one can, with a high degree of accuracy, predict his behavior in situations when this point of view is involved. If an individual has a passion for honesty, one can believe that his actions will be honestly conceived. If a woman in her emotional life is committed to unselfishness, she will only on rare occasions and in moments of emergency exhibit selfish conduct. The tenor of her behavior will be unselfish. It is, in short, a truism that as a man feels in his heart so will he behave. The attitudes are powerful determinants of actions.

This fact is recognized by all governmental agencies which deal with masses of people. In America, when it was necessary for the nation to strive to win a war to which it was committed, publicity and propaganda became a major arm of the government. Scores of methods were utilized; speeches, posters, news releases, public meetings, personal social pressure, and motion pictures. Every known device was used to create enthusiasm, desire, conviction; in short, to create a favorable attitude toward participation to the utmost. In Russia, correspondents and
travelers tell that the government has similarly adopted every method to create a favorable attitude toward the ideals and activities of those in power.

Because of the significance of attitudes and points of view, the Thurston-Peterson study is of unusual significance to an audience of school people, and for that reason some of its educational implications in detail will be described.

The principle of the procedure used in the study was simple. A group of children was given an attitude test. They viewed a selected picture and were given the test again. The difference between their status on the first and second tests was assumed to represent the change in attitude toward or against the object.

The tests were constructed by the well-known Thurston technique. Each consists in essence of a series of some thirty weighted statements about the object toward which the attitude is to be measured. These statements range from those extremely favorable to those extremely adverse. For instance, in the scale for "Attitude Toward Punishment of Criminals," at the two extremes lie "Only by very cruel punishment can we cure the criminal" and "We should be

13 "The Effect of Motion Pictures on the Social Attitudes of High School Children."
ashamed to punish criminals." After an appropriate checking of agreement or disagreement with each statement by the person tested, the score for each individual and the medians for the group of pupils can be calculated and located at a specific point on a scale.

The objects toward which attitudes were tested before and after the exhibition of pictures were eight in number: (1) the German, (2) the Chinese, (3) war, (4) prohibition, (5) crime, (6) criminal occupations, (7) capital punishment of criminals, and (8) the negro.

Correlative with the construction of scales the investigators sought for pictures which were thought to exhibit strong leanings toward or against an object. Thirteen pictures were selected from about seven hundred pictures shown currently in the theatres. Specifically, "Four Sons" and "Sons of the Gods" were favorable to the Chinese and "Welcome Danger" was unfavorable to them. "Streets of Chance" was judged by the investigators to be unfavorable to crime and criminals. "Hide Out" was unfavorable to prohibition. "The Valiant" was against capital punishment. "All Quiet on the Western Front," "Journey's End" and "Four Sons" were unfavorable to war. "The Criminal Code," "Alibi," "The Big House" and "Numbered Men" were unfavorable to the punishment of criminals. "The Birth of a Nation was supposed by the
investigators to be unfavorable to the negro.

The study showed that if one wants to propagandize people in favor of or against certain values, it is a simple task to find the picture. In less than two years, with the part-time services of an investigator, the authors were able to locate thirteen pictures that served their highly specialized purposes. One investigator for the office of Education in Washington or a representative of a state department of education in a state censor's theatre could easily locate for the schools of the nation or for a state the commercial pictures which would be useful in developing a favorable attitude toward important virtues and ideals. When these were so located, the schools might then be notified through appropriate channels.

The findings substantiate the judgment that if children continue to be exposed to influences in the motion pictures which propel them in one direction, one may expect that the anticipated attitude will grow stronger in some proportion to the number of exposures, even though exposure to one or more of the pictures in isolation may have no measurable effect. It would be interesting to teachers to know the point beyond which continued exposure ceases to have a measurable effect. It is fortunate for them, however, that a few exposures to a picture favorable to a desired attitude will produce appreciable
results. Likewise it is unfortunate for their peace of mind that children can be so easily exposed to pictures in huge numbers which cumulatively break down favorable attitudes toward motion pictures which teachers and parents have built up with thoughtful care.

The major conclusion to be drawn from the results is that on the whole the effects of motion pictures "are very definitely lasting," to quote the words of the investigators. Teachers may assume that if they use this medium for teaching important lessons, the results will be persistent.

That visual aids for teaching of safety have value, is demonstrated by the fact that industry, which is largely interested in the economic value of a method, has so whole-heartedly adopted them in its safety campaigns. Thousands of safety posters are in daily use in practically every industry. A number of motion-picture films have been made solely for the purpose of teaching safety to the employees in industrial plants. Strange to say, however, the schools, for the most part, have been slow to follow in the footsteps of industry in attempting to teach the most vital subject. Shop teachers in general have depended upon a few general talks on safety and on a few posters, which after being placed on the shop walls
are promptly forgotten, for teaching safety.

It is true, the most effective way of teaching safety in the school shops is actually practicing safety when using tools, machines, and equipment in the shop, yet it is difficult at times to show the proper safety precautions on certain machines to the entire class. This may be due to the fact that it is difficult to demonstrate some phases of safety in such a manner that the teacher can be sure that each member of the group can see exactly what is being shown. Another difficulty in demonstrating on the machine is the fact that it is usually impossible to show what may happen if the safety precautions are not followed. Of course, psychologists say that it is not good practice to show the wrong way of doing things. Yet many times, this is the most effective method to use especially in teaching such a subject as safety where it is imperative that the pupil be not permitted to experiment with the wrong way. Most psychologists, however, do not entirely disapprove of this method provided that the correct procedure is first shown. With this attitude there can be no quarrel.

The motion picture is a very effective aid in teaching
safety, and although its use has been rather limited, yet it is becoming increasingly more popular. There are a number of these films available at present which can be obtained with little or no cost to the schools. These films do not necessarily have to deal only with safety, however, as many industrial films show not only the safety methods used in industry, but other information as well. Motion pictures dealing with various aspects of safety in the school shops also can be made by the school on 16 mm film. Such films will stimulate much interest and enthusiasm in safety education. Films of this type have been successfully used by a number of progressive schools.

While the school is primarily concerned with safety education in the school shop, nevertheless, the shop instructor should also be concerned with safety methods used in industry. This too can be accomplished by using motion pictures. With the aid of slow-motion-picture photography many safety devices which normally operate quicker than the eye, can be clearly shown. Then, too, most operations in industry are performed on machines running on a production basis, and where speed is an important factor, this requires different types of safety devices from those used on machines in the school shops where speed and quantity production are not the primary aim.
For years, art teachers have desired to see films used in art education. As early as 1920-1921, a report on "Cinema et l'Education Artistique" appeared in the Bulletin de l'Institut Psychologique, by M. Adrien Bruneau, the teacher at L'Ecole Nationale des Arts Decoratis. The article contains a psychological justification for using films, daily programs for their most effective utilization and illustrations of pupils' work with films. Apparently the film is used as a means for training in observation.

The idea of using films this way originated from observation of children watching action motion pictures, and from noting that sometimes they could even be surprised attempting to draw the movement. This led to a careful selection of outstanding episodes, and the repetition of the same movement, these being the present 15 features of the Models in Motion.

IV. STILL PICTURES

The stereograph gives a conception of reality that is not given by any other picture. The third dimension

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gives actuality of form and a strong feeling of intimacy. Its impression on the pupil is tremendous. He feels that he is a part of the pictured situation. It lends itself particularly to individualized work. Only one pupil can see it at a time. To the keen teacher and supervisor, this is not a handicap but an asset. It makes necessary an emphasis of the individual aspects of education that have been so much neglected. Each pupil sees his own relationship to the pictured situation and brings to the class discussion his own thoughts on the subject. Through vivid presentations the teacher is here cultivating original thought, favorable attitudes and habits of active participation. No commonly practiced visual activity of the school can compare with that of a pupil closed off from the rest of the world by the hood of a stereoscope, lost in the contemplation of the realities of the stereograph.

The stereograph, of all the visual aids, is unquestionably used least by teachers. Yet the stereograph because of its low cost, and its three-dimensional pictures, with perspective, should have an especial appeal

to any teacher with a limited supply of actual specimens or models. Of all pictures the stereograph is the nearest approach to reality.

As a matter of practice, there are three ways of getting stereographs to pupils for their individual use. In the modern platoon school with a library and a librarian in charge, the stereographs naturally take their place with library books and all other reference materials. This is, undoubtedly, the ideal method of using stereographs and the method that will ultimately become universal.

In schools, however, where all such materials must be handled by the classroom teachers, two possible methods of using stereographs are in common practice. Some teachers like to have in their room a reference table to which pupils may be at liberty to go as they may have use for the reference materials available. Every reference table in such a school should have as its permanent equipment one or two stereoscopes and a collection of third-dimension views appropriate to the subject matter being pursued at the time. If a project on Indians is being worked out, then a selection of views of Indian life is appropriate. If the New England States are being studied, then a selection of stereographs of New England on the reference table will enable the children to "live" in New England as they pursue their study of this section.
Other teachers find it simpler and more effective to have stereoscopes, preferably one or two or on occasions more, passed around the room from hand to hand during the study period. In this method, there is probably less confusion and more certainty that every pupil will see the stereographs selected to coordinate with the subject matter under discussion. In a classroom of forty pupils while one pupil is looking at a collection of views, the remaining thirty-nine are going ahead with their individual reading or study. No one waits for anyone else. No delays are necessary. Such a means of getting the collection of stereographs to each pupil may be used daily without in any way detracting from the time that would otherwise be given to the conventional type of lesson preparation.

By any of the methods suggested above, the pupils of a classroom, during the progress of the study of that unit, may examine again and again the twenty-five or more stereographs included in a section to be used with a specific unit. They will never tire of the marvelous insight into the questions that may arise daily in connection with their reading and in the group discussions of subject matter of the unit which each use of the stereograph will give them.

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Slides are useful to the lecturer, instructor, entertainer, and advertiser. The statement has often been made that pictures tell a story quicker and better than words, and it may be added that pictures give a clearer impression than can be secured from a word description. Just as the appeal to the eye is more effective than the appeal to the ear, so is pictorial representation more effective than description. Thus a written description, however detailed and accurate, can never quite bring home the characteristics of Gothic architecture as a collection of photographs of the famous Cathedral of Rheims.

The use of lantern slides and of strip films is somewhat different from the use of motion pictures, and is also considerably simpler. As with the motion pictures, however, slides should be previewed and notes taken, reference readings should be compiled, and other helpful materials should be developed. The showing of slides should be accompanied by as free and vigorous discussion as possible. In most cases it is unwise to attempt to run through a whole set of slides. By showing only a few pertinent pictures, and discussing these thoroughly with the group, real

learning will be more effectively accomplished.

McClusky, in his outline of a proposed textbook in visual education, suggests the following as a guide to those who desire to make the most effective use of glass slides:

1. The lantern slide lends itself admirably to socialized activity. Because of its "group appeal," it makes group consideration of a subject practicable in large classes. Many unprojected pictures are too small to be seen distinctly by all. The lantern slide may be seen by every child in the group while discussion is taking place.

2. The lantern slide focuses the attention of a group of pupils.

3. The lantern slide stimulates reflective thinking. It is possible for the teacher to control the length of time the picture is exposed so that the class may concentrate on each feature as long as is necessary.

4. The slide is flexible. It lends itself readily to being correlated with the subject matter under immediate consideration because any portion of a series of slides can be shown when needed without running through all

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other portions. It is also possible to refer to the same slide several times during the course of the lesson, because of the ready accessibility of each slide.

5. The slide provides an admirable means of reviewing a topic. It "tests the ability of the pupil to discuss a topic in a clear, vivid way." Slides may be referred to again and again.

6. The ink, pencil, ceramic silhouette, opaque, and cellophane lantern slide may be made by teachers or pupils. It is thus possible to "show only what is required without any distracting features." The cheapness of "home-made" slides makes them readily available to all teachers having access to a projection lantern.

7. The smallest number of slides required to develop, or interpret, the concept is the number of slides to be used. If one will do it, that is the number to be used. If more than one is required, the thought unit must be kept down to such a size that confusion of ideas will not result. It should be remembered that these experiences are to be remembered the same as new words in spelling, new combinations in arithmetic, et cetera, so that these can be recalled later and the imagery used in later thinking.

8. By projecting the picture on the blackboard, all sorts of markings may be made on the picture and erased without affecting the picture. This holds true not only
for writing or printing words on the part of the picture which they symbolize in reading; but also such markings as are needed to explain the operations, motions, special points of interest, et cetera in the upper classes of the elementary school. By this means the need for the motion picture may be reduced.

There is scarcely any subject taught in schools in which lantern slides may not be used to advantage. The first and most obvious use, of course, is in connection with the teaching of the social studies. Photographs of practically every interesting geographical fact in the world have been secured. There is such a wealth of material that through selection it is possible to secure lantern slides of very high teaching value. Through the use of these slides, the teacher of geography is enabled first, to present vividly and quickly geographical situations within the experience of no one in the group, and secondly, to bring readily to the common attention of the group important situations not sufficiently vivid in their minds to make them highly useful in learning.

There is in connection with the work of the teacher of geography, of course, the possibility of presenting in lantern-slide form maps and charts, both photographic and hand-made, to enrich the daily teaching program, to fix the facts taught, and to save time in presentation.
Lantern slides have great possibilities in the teaching of history and literature. The geographic factors, of course, have a large place in the teaching of such subjects. All such aspects of the subject matter may be presented in lantern-slide form. In the teaching of history there is the possibility of showing monuments and historical landmarks in very attractive form. One of the great advantages of travel seems to be the interest engendered by visits to the shrines of history. Although presentation in lantern-slide form is perhaps not as highly valuable as a visit to the situation itself would be, nevertheless, it brings within the schoolroom thousands of such situations entirely beyond the possibilities of a personal visit by any number of the group. Frequently the pictures of such real situations can be effectively combined with old prints, cartoons, pictures of manuscripts, et cetera.

In the teaching of literature, as well as in the teaching of history, there are paintings, old prints, and old pictures of all sorts that may be reproduced and presented. Manuscripts and historical documents are also of great interest and value. Teachers of history everywhere are finding the use of the stereopticon a most valuable aid in really getting over the subject matter they wish to present and in doing it at a great saving of time.
Elementary science offers a rich field for the use of the lantern slide. Excellent photographs of almost every subject the nature study teacher wishes to present are available. Birds, flowers, and trees may be reproduced in plain form or in color, by photographic process or through the use of hand-made slide materials. Here, again, the elements of vividness and the saving of time are beyond question.

Recent developments have brought to the attention of educators what is perhaps the greatest possibility yet found in the use of the stereopticon and lantern slide: the use of the lantern slide in teaching reading. First, there is the possibility of projecting a photographic slide, usually preceded by individual use of the duplicate stereograph, or a hand-made lantern slide on the blackboard, and then writing words, phrases, and sentences into the picture. This procedure makes use of the principle of close association, long understood by teachers but never put into use in any more interesting or effective manner.

Second, there are the possibilities of cellophane typewritten slides, which give the teacher of beginning reading a wealth of chart material, cheap and easily adapted to changing need and situations. Furthermore, with typewritten slides made interesting and meaningful by a few photographic and many hand-made lantern slides,
the teacher of beginning reading now is able to develop socially, on the screen and on the blackboard, and, therefore, with much less time, all the techniques and mechanics of reading. Children taught in this way are literally "taught to read without books." Their first use of books is not for what may be the difficult and unpleasant task of learning to read, but rather the first use is for the purpose of reading. They approach the book with a purpose not unlike that of an adult in his reading for information and for pleasure.

As an illustration of how visual aids might be practiced under certain typical conditions, probably no better example could be found than in slide sixty-seven of the "Keystone General Science Unit on Health." On this slide are seventeen excellent reproductions of microscopic photographs of plant and animal life. A single microscopic slide of any of these specimens would cost at least fifty cents, therefore, one lantern slide contains the equivalent of $8.50 worth of microscopic slides.


Furthermore, when the slide is projected on the screen it may be viewed simultaneously by every member of the group, whether there be ten or fifty. By questioning the pupils and pointing to the pictures the teacher may be definitely sure that the pupils actually see the specimens which it is desired that they see. Of course, no one can contend that a microscopic photograph is as valuable a piece of equipment as the actual specimen viewed through a high-powered microscope, but assuming a class of twenty or more pupils and one low power microscope, lantern slides similar to the above would unquestionably be of practical value to the biology teacher.

Slide ninety-seven from the "Keystone Unit on Light" is an excellent illustration of how a projected picture may be used where the actual apparatus is not available, to teach different principles involving the use of complicated mechanisms and processes. On this slide is a photographic picture of the interior mechanism of a modern sound-on-film projector. This slide shows the source of illumination, the sprockets, and film threaded through the machine, the projection aperture, condensing and objective lenses, the sound head with its alignment of exciter lamp, optical lens, sound gate, and photo-electric cell. One side of the slide is an enlarged section of film showing
the arrangement of the sound track.

The above examples are, of course, merely illustrations of how a visual aid may be used to supply a deficiency in equipment. Such instances, using not only slides but also stereographs and motion pictures, might be multiplied many times over.

Certainly it is true that the average science teacher will find visual materials to be a valuable supplement to whatever he may have in the way of physical equipment, and will find that by the use of such aids he has tremendously increased the learning possibilities of the pupils.

Lantern slides or charts presenting various safety devices can be so shown that each member of the class can readily see what the teacher wants him to see. By the same means, the result of neglecting to use the safety devices or heed the safety precautions can be shown without endangering persons or machines. The use of this visual aid is not accompanied by distracting noises which may prevent some from hearing, nor does it cause the class to become distracted by the actual motion of the machine. With this visual aid, the attention of the class can be

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definitely focused on what is being discussed. Also, through the use of visual aids, even the safety devices and hidden dangers which it is extremely difficult to show a group can be clearly portrayed.

There is no visual recording tool more expressive of the world today than the camera. It registers actions that will never be duplicated, fixes patterns that will never be repeated, and captures sensations that will never occur again. With the microscope it penetrates the inner activity of materials; with the telescope and aerial photography it charts huge surfaces and vast regions; by telephoto and with the infra-red ray it annihilates and dissolves distance. It is the mirror for concrete experiences.

The images of the motion picture with its dynamo of sound and movement come closest to these concrete experiences. The stereograph gives the third dimension to the person observing the stereograph. The flat picture, where these elements of concreteness are subtracted,

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24 By flat picture, the author means an unprojected picture.
remains for intimate and protracted study. Its importance lies in its comparative availability and its economy. It still holds its advantage in the use of color. Because of its head-start in time over other camera techniques, it covers more ground. Of all the arts of presentation it is the most familiar to the person of today. Constantly present in any newspaper, in the magazine, in advertising and display, it plays a vivid part in the daily habits. This, plus the fact that visual images are basal to ideas and thinking, makes it the most vital method of communication. It has become a necessary part of the language of education.

There are two approaches in the use of the photograph, each sharing in the power to make instruction more effective, interesting, and profitable; that is, in the power of motivation where the pupil "is placed in a situation where it is desirable to make comparisons, secure information, and calculate solutions to problems, thus developing a need for the use of letters, words, figures, and other symbols of thought."

The first of these approaches, and it is becoming a more and more prominent means of training, consists of direct experiences, entailing the actual making of the photograph by teacher and pupil. It includes first-hand experience in observing, making the shot, and
finally fixing the record.

The second approach is through vicarious experiences obtained by purposeful accumulation and use of the observations and visual recordings of others, which reveal the expanding horizon of new concepts, develop the power of interpretation, travel to distant lands, create extra-personal attitudes, penetrate the mysteries of the body and structure of nature. Whenever teacher and pupil cannot be in direct contact with the living subject material they can turn to the myriad mirrorings of other people's minds. It is often possible to unite these approaches in special situations. Dent tells of one prominent visual instruction director who,

...secures a good picture of a pineapple field, for example. Next, he takes a picture of a member of the class in with the picture of the pineapple field to be used. By clever photographic procedure, he combines the two to make a picture of the pupil in a pineapple field. The pupil is instructed in advance that he or she will be expected to tell, during the showing of the picture, just how it seems to be in a pineapple field. In order to do this satisfactorily, that pupil must find out as much as possible about pineapples. Although photographic trickery is used to build a false situation, that situation proves to be a great motivating influence and increases the interest of the entire group in that subject.

Textbooks containing pictures, charts, and diagrams have been used for nearly four and one half centuries. Only in very recent years have projected pictures
been used as aids to teaching, and then, it was left to industrial organizations to make the first use of them.

John Amos Comenius, 1592-1671, was the first to suggest any systematic and organized use of visual and other sensory materials in education. With him, a knowledge of physical phenomena was highly important. He would have children see nature and learn how nature functions. Comenius condemned the practice of having children learn words without any sense of their meaning. "Children," he said, "must learn not only from words, but also from objects along with words." To give practical application to this pronouncement, he compiled and issued his Orbis Pictus, the first illustrated textbook.

Talbot, about a century after Comenius, believed so strongly in the suitability of photography for book illustrations, that in 1844-1846 he issued a series of twenty-four plates (positive prints from calotypes) under the title of the Pencil of Nature. The subjects included the "Boulevards of Paris," "Bridge of Orleans," "Lacock Abbey." In only one picture were figures introduced.

The reading and study of any printed page is a "visual" modus operandi. Much of the value of any book depends, from the impact of its first impression throughout the reading, on matters of typography, illustration, layout, and design in general. In recent years the visual
value of books has become an important concern in book production, in "textbooks" as much as in "trade" books.

V. GRAPHIC MATERIALS

Graphic materials may be usefully integrated with other visual aids for the purpose of increasing their effectiveness in the preparation for a unit of study and for testing. A class may chart the route to be followed in a school journey, follow the course of the route by referring to a map during the journey, and use the map or other graphic form as a method of summarizing and testing the information gained. A diagram can be used to emphasize a process observed in action in or out of the classroom. Animations are included in motion pictures, illustrations incorporated in collections of slides and other still pictures.

In turn graphic materials may be enriched in meaning by building on the experiences provided by other visual aids. Posters in the school shop depict the correct method of using tools and equipment. Such posters may show the proper manner of carrying sharp-edged tools, the need of removing nails before discarding a board, et cetera, also the results of not observing these precautions. An excursion to a commercial cabinet shop following the display of these posters generally fixes the principles attempted to be taught in the pupils' minds.
CHAPTER VIII

OBSTACLES

William F. Ogburn, of the University of Chicago, points to the gap that exists between the best knowledge and the ability to apply it. He declares that education is afflicted with a cultural lag. As George Bernard Shaw once remarked: "Education is always driving the tacks where the carpet was two weeks ago."

The typical educational agencies have been depended upon, and this means primarily reading methods, for eliminating the cultural lag that Dr. Ogburn points out. Yet, by this method there is a major difficulty to be faced. Only a relatively small proportion of the population has had the advantages of high school education and a negligible group has had a college education.

Why should education be pedestrian, commonplace, and unimaginative? The commercial radio and the commercial motion picture play cheap tunes on the emotional strings of children and youth. Are there not any songs to sing in the classroom? Children are permitted to be excited about whether boy gets girl in the motion picture. Why not excite them also about whether democracy is to prevail in the United States? Whether fascism is to win
in Spain, in Europe, in this country? Whether a few people get a lot and a lot of people get little? Whether workers are massacred in cold blood by Chicago police? Whether youth is going to have an opportunity to marry and start a home? Whether adults are to be pitched into the industrial scrap-heap at the age of forty-five years? Whether the genuinely beautiful and shiny and marvelously efficient mass-production machinery is to rust periodically every eight or ten years? Whether there is to be social security for all? Whether the marvelously effective life-giving machine that is called the motion picture is to languish, as far as school use is concerned, while two sixty-million-dollar death-dealing battleships may be made to gratify the whims of the militarists and jingoies?

Thus far in the motion-picture program little more has been done than accept typical school standards for certain knowledge that is to be transmitted, put this material into the form of acceptable motion pictures and then use them in the classroom. The cold-storage concept of education has been accepted and films have been used as a device for lowering the temperature of the refrigerators. There has been a failure to infuse any films with the emotional warmth that is necessary for problems and their solution if these are to be alive and functional in the lives of children and youth. There is a film
on the automobile, for example, the process, the mass-
production technique; but there is no film which shows
an automobile factory shutting down in 1929, and why it
may shut down in 1939, and again in 1949. The effect of
mass-production supplying of automobiles is shown, but
the effect of mass production on the worker himself is
not shown. Charles Chaplin's film, "Modern Times," which
shows that man has become an automatic part of the machin-
ery, is an exception. Again there are films on lumbering,
but no films showing that somehow or other the arrangement
of the economic structure does prevent a third of the pop-
ulation from living in adequate homes. There is a film
on electricity, but there is no film showing that only
one tenth of the rural homes are equipped with electricity.
Nor is there a film which would show that by adequate
planning there would be no need for paying five cents
per kilowatt hour for electricity. There are also,
literally, hundreds of films that show subtly or directly
the advantages of private ownership of industry, but there
are few or no films to show the disadvantages, or more
important, certain advantages of public ownership. There
are educational films on cotton growing, but only one film
on the life of the sharecropper. There are educational
films on health, but few or none which show that one third
of the population is ill-fed, and this according to reliable
statistics from the Department of Agriculture.

There are films which will illuminate and clarify the democracy-autocracy concept. What teaching film ever brought out the idea that the workmen are often mere automatons carrying out ideas or orders from above, and showed the resentment of these workmen as many of the efficiency systems were set up to speed up production? What is democracy in the factory, the home, the school, the church, or city government? It is a concept that has not been adequately explored; yet how valuable it would be to use films for case studies of democracy and the democratic way of life or its absence.

Further, there has not only been a failure to hold the factual accretions together with the integrating power of purpose or direction, but there has also been a failure to keep them together with the cement of emotion. Education has been predominantly intellectualistic and has looked with disfavor upon emotion. Neither can or should exist without the other. The false dualism between emotion and intellect must be dispelled.

Yesterday most "classroom" motion pictures were as dull as textbooks. Today they are duller. Improvement

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in topography, design, illustration, style, and substance have made the textbook a competitor with the extra-school press for child and adolescent interest.

Not so the "classroom" motion pictures. These have not kept pace. Most of the basic silent educational films found in school libraries were produced nearly fifteen years before 1939, and most of the films in the educational libraries are silent films. Theatrical films of that era are now museum pieces. Film societies have been formed all over the country to study them for the relation that they bear to modern motion pictures.

At all times there has been a lack of coordination between the best educated minds of the nation and those who have essayed to produce films for school use. In the early nineteen twenties the stupidity which characterized too many of the entertainment films produced in Hollywood caused considerable criticism among the better classes of American people; those with whom the control of American schools rested. Social workers and educators were highly critical of the moral tone of the run-of-the-mill entertainment pictures. This resulted in a reaction against the motion pictures which found expression in the "Motion Picture Research Council" and the "Legion of Decency."

Much of the antagonism among the educated classes in America toward Hollywood productions was transferred
to all motion pictures. The early producers of educational films found it difficult to change this current of thought in American intellectual life when they came face to face with it in trying to sell films to school authorities throughout the nation.

Furthermore, the theatrical producers and distributors fearing that the "educational" market might develop in competition with theatres issued an edict through Will Hays that the schools should confine their motion picture efforts to informational films only.

One wonders what would have happened during those hectic days after the World War had one or two Hollywood producers released high-grade entertainment pictures expressly made for school, church, and community center exhibitors. It does not take a stretch of imagination to see that an enormous competitive market might have been created which would have had a real effect upon theatrical productions in general.

But none of the major producers had the vision or courage to do it. Rather they chose to block the competition of schools in the entertainment field. Those productions suitable for school use which might have been placed in circulation were bottled up in their vaults. Time will tell whether this log jam is permanent or whether a little dynamite judiciously placed will release it.
Another complication arose from the fact that many schools bought projectors without investigating thoroughly the films which were available for school use. A few good films had been judiciously used by coached salesmen to intrigue boards of education and school officials into the purchase of projectors who found after the meager supply of good materials had been exhausted, that they were adrift without a compass to guide them. Many then turned to advertising and propaganda films.

These free films had been produced in large quantities by industrial concerns and others who were quick to recognize the potentialities of motion pictures for sales and advertising campaigns. School film libraries soon were filled with free films to which were added those produced by government bureaus and other agencies. In fact the government deposited in city schools, universities, and museums several thousand reels of film that had been discarded after the World War. All of this did not help the sincere producer of educational pictures, of which there were a large number in the small-fry class, because he found himself not only in competition with others like himself but also competing with a low rental market created by free film.

To add to the general confusion, at the time these early production efforts began to manifest themselves,
American education was preoccupied with a number of new intriguing interests such as educational tests and measurements, junior high schools, the Gary plan, project teaching, the Platoon system, et cetera. Educational leaders were so busy testing, surveying, and diagnosing these other "movements" that they had little time to spend upon motion pictures.

In all this razzle dazzle the motion picture is being neglected as a part of the main program. It is looked upon as a side issue. No guiding principles are formulated and no policies developed. A few bureaus of visual instruction have been established in city school systems and in universities, but those in charge of these enterprises have become largely clerks or curators after the fashion of museums and they are seldom consulted with respect to major changes in curricula, educational policies, teacher training, or school building. The directors of visual instruction in such libraries have to be content to collect and catalogue materials with the hope that teachers will find some value in what they have to offer.

Suppose cinematograph producers of dramas made a subject and left out the principal character, that is,

they are producing Hamlet and they leave out Hamlet, leaving to the imagination of the audience to visualize all that Hamlet did in the play. Or, in an eight-reel film, they left out two reels that were of the utmost value to explain the drama, here again leaving it to the imagination of the audience to solve the plot that is in the missing reels. What would the public say, and how long would they attend such mutilated exhibitions?

This is what is being done with pedagogical subjects, which need, in some instances, as many as eight or ten reels of scientific facts, and there is made one reel or less, and it is left to the pupil to visualize the deficit.

It is fully understood that a commercial company incorporated is useless for the task. Investors in such companies will lose all they invest, even as they have done in the past and will so do in the future. The organization to supply these educational needs must most essentially be a philanthropic foundation, having executive officers, trustees, directors, and faculty, conserving the funds donated to such a vast enterprise. Educators and philanthropists, who have studied the subject, well know the enormous scope such an organization would have in international relations. They also realize the outstanding fact that the immense possibilities of real pedagogical
cinematography are practically untouched. For all teacher's service, each particular subject should be in the school library, and if he wishes a study, he selects a reel and instructs his class from that angle. However, they generally have to subscribe from a circulating library, and in all probability will receive a substitute film for the one that they want.

The business of making motion pictures for education calls definitely for the creation of a national committee of the best educational brains obtainable to develop definite policies with respect to the place of motion pictures in education and then to proceed to blueprint any course of study at any time in terms of research findings as to the particular topics which should be taught by motion pictures.

Finally, in order to secure the kind of educational leadership, which the production of motion pictures needs, it is essential that the educational advisers retain their professional status. The framework in which they would perform would have to be a non-profit foundation type of set-up, the outlook of which would be national in scope and would be free from any special interests or

desires to propagandize the educational film.

Another criticism to be directed against educational films in general concerns the mechanics. Titles and pictures are often not kept in due proportion, and sometimes still pictures are given too much space. If a motion picture is anything, it is a means of presenting motion. And yet a report in the book by Freeman, to which reference has already been made, shows that in ninety-six educational films, approximately 33 per cent of each film was devoted to titles, 12 per cent to still pictures, and only 55 per cent to action pictures. The many films today, notably the Eastman films, are in this respect better proportioned, but there is still much room for improvement.

Some educators claim from their own experiences and observations that the values received will not justify the cost of films and projectors. Most of this trouble is not with the films, but with faulty film teaching technique. Some of the common errors in film teaching technique are:

1. Some mistakes may be charged to poor organization of film and equipment facilities, especially where films are available to the teacher only at arbitrarily scheduled intervals.

2. The casual presentation of five or six reels at a time clearly demonstrates the teacher's lack of familiarity
with the film as instructional medium. Where direct teaching is to take place it is probably unwise to show more than one or two reels. Educational pictures are not intended to compete with entertainment films in holding attention over a three hour program.

3. Presentation of a group of more or less unrelated films is another faulty technique. Some teachers will herd all eight grades into an auditorium and show four to five unrelated films and then ask the children to write a composition of "How the Pictures Helped Me."

4. Another type of mistake is that of showing the picture at the wrong time. Definite loss of interest results from the postponing of showings.

5. Teachers who have utilized the manuals accompanying sound films have found them especially helpful in preparing for the use of the film and in organizing activities after the film has been presented.

6. By far the most serious mistake in the use of films is the failure to introduce the film as a stimulating learning activity.

7. Aimless discussion following the showing reveals the lack of specific purposes in developing important concepts.

Films produced for classroom use should offer many experimental possibilities, and many teachers ought to work in the lines of their special interests with films.
CHAPTER IX

TRENDS

If it is left up to the efforts of scattered individuals throughout the country, progress will not only be slow but the universal use of visual aids in schools may be delayed for several years. Unless efforts are unified, visual instruction will only come about by a gradual infiltration and as the past history of education has shown to date, the infiltration will be motivated by special interests and hobbies which will not have the best interests of education as their main purpose. The power of the motion picture to develop behavior and attitudes in keeping with educational purposes would, if it were properly used, not only step up the intelligence of the citizenry both with respect to moral, social, economic, and political issues in this country but also with respect to world problems.

In America, since the World War, the educational film movement has been steadily gaining momentum. Films have been developed and are being used in every academic subject, including Art. A growing body of literature is to be found, and the keenest minds are turning towards this new and important field. All indications point to a tremendous expansion in the scope and nature of educational
An Englishman has reported that the educational-motion-picture movement in England is an impressive spectacle of a nation with a social life already closely organized, girding itself for effective use of this new instrument of progress. Then he remarks that a sprawling people like the people of the United States may well mark, inwardly digest, and take like action. After reading what is available in the use and progress of visual aids in foreign countries, it seems possible that they do have something to offer that the United States may well follow, especially the practices of England and Germany.

A strong plea in behalf of provision of teaching films for the schools has been made by a widely representative body of Englishmen organized as the "Commission on Educational and Cultural Films." The commission was initiated by joint action of the "British Association for the Advancement of Science" and the "British Institute of Adult Education."

The first use of the film is to show life to beginners

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as the art of living. The ordinary picture theatre aiming at amusement, excitement, and entertainment for adult shows life always under unusual conditions and, therefore, teaches false views of life. The school ought to feed the minds of the scholars by showing them true views of life. But the cinema, however, harnessed to school use, is not a substitute for good teaching.

The systematic use of instructional films in German schools was ordered by a decree of the Minister of Education on June 26, 1934. The film was thus made an integral part of the curriculum. Its purpose was clearly stated in the decree, namely, "The film as a regular medium of instruction is to replace textbooks, et cetera, in all cases where the moving picture will make a stronger appeal to the child than any other medium." It was made plain that the film is not to replace the teachers, but that it is to supplement and amplify the work of the teachers.

A central administrative organization for handling the school film, the "Reichsstelle fur den Unterrichtsfilm" was established immediately after the decree was made in 1934. One of the first tasks was to equip the approximately sixty thousand common schools with the proper film apparatus

and to provide films adapted to the curricula of all school grades. The next step was to train teachers in the film technique and the manipulation of equipment. To this category of common schools there were then added the higher institutions of learning, the technical and vocational schools and the higher rural schools.

Visual education has become one of the most widely discussed subjects in the field of education today, not only in America, where hundreds of schools are being equipped with up-to-date apparatus for the more efficient use of the materials, but also in nearly every enlightened country of the world, including England, Sweden, Denmark, France, Germany, and Japan.
CHAPTER X

GENERAL SUMMARY

I. SUMMARY

This study disclosed that the factors involved in a program of visual education are: (1) Teacher, (2) Child, (3) School, and (4) Materials. The use of visual aids, with the exception of the motion picture, has been available to the teachers as long as a record has been kept. The motion picture has been comparatively little used by the teachers as an educational medium.

The child, the most important factor in the school, learns more rapidly, more permanently, and is less confused by seeing pictorial presentations than getting the idea from the printed page.

The effectiveness of the school which is dependent upon the teacher and the child, must be made appealing to the child by permitting him to participate in activities that are natural to life outside the school.

Materials interest the teacher to the degree that these help the pupils solve their problems. At first the tendency in visual education was toward more formal and technical materials, such as books. Now the tendency is toward whatever will make education appealing to the child.
Such materials as visual aids are intended to clarify and intensify the learner's mental images of the object, process, or event being studied.

The purposes of visual aids as brought forth by this study are: to give initial concepts, to broaden the sensory experiences of the learner, to intensify impressions, to vitalize instruction, to give vicarious experience in activities outside the pupil's environment, to give experiences with concrete things, to motivate, to supplement other learning, to vary classroom activity, and to save time.

Various studies reported have shown that these are purposes attainable in the schoolroom. The Payne Fund Studies have made it apparent that the motion picture could be of great value in teaching attitudes, understandings, and in developing types of behavior which are now not stressed in the present course of study. Such matters as health and safety, social and international problems, and wholesome entertainment can perhaps be best taken care of in the curriculum at relatively low cost through the medium of the motion picture.

II. CONCLUSIONS

Visual education as revealed by this study is rapidly gaining impetus and teachers are learning new
methods of using visual aids for teaching pupils. Progress is not only being made in this country but in England, Sweden, Denmark, France, Germany, and Japan.

III. RECOMMENDATIONS

The successful use of visual-sensory aids in the classroom requires special training on the part of the teacher. Not only must the teacher know the psychology and philosophy of education, but in addition he must know the specific contribution each visual sensory aid makes to the learning process.

Dr. Charles Hoban started this movement by making a teacher training course in visual education compulsory in the normal schools of Pennsylvania.

At the Los Angeles meeting of the National Education Association, July, 1930, the Department of Visual Instruction passed the following resolution pertaining to teacher training institutions:

Resolved: That the Department of Visual Instruction of the National Education Association earnestly recommends that a course in visual and other sensory aids in teaching be required of all persons preparing for the profession of teaching and that teacher training institutions in every state be required to organize and offer such courses beginning with the scholastic year 1932-1933.
The committee appointed for outlining a core course for teacher training institutions reported at the Atlantic City meeting in 1932. Their suggestion included the following items:

- Historical background
- Psychological aspects of verbalism
- Projectors and projection techniques—still and motion projectors; housing, care and techniques
- The school journey—organizing, conducting, and checking results
- Museum procedure
- Pictorial materials—standards for evaluating, mounting, and filing; housing and care of stereographs; mending films and film-strips; housing and care of slides, films, and film-strips; techniques for all
- Objects—specimens—models—assembling, housing, care, and sources
- Photography—still and motion picture techniques; development of films, making prints, making blue prints; standards and sources
- Blackboard and bulletin board techniques
- Administering and budgeting visual-sensory materials
- Radio—apparatus, procedures, programs
- Apparatus and equipment
Miscellaneous

Bibliography

Within the years following this report, a number of universities, normal schools, art colleges, and teachers colleges have included in their offering of subjects a visual-sensory aids course. In Pennsylvania a laboratory course is a prerequisite to obtaining a certificate to teach in the public schools of that commonwealth. Other states are seriously considering such action.

Since visual-sensory aids are a growing method of instruction, and since they are becoming a major educational issue in many foreign countries, they are forcing themselves on teachers who are unfamiliar with the techniques employed.

Therefore, in the fact of such knowledge as has been brought to light by this study, it is recommended that Indiana State Teachers College incorporate a methods course in visual education in its offering of subjects.
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