AN ABSTRACT OF THE THESIS OF

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Title EVALUATIVE CRITERIA FOR AUDIO-VISUAL MATERIALS

Abstract approved

The great amount of materials and equipment now available in audio-visual education make selection a necessary function of any teacher using audio-visual techniques. Selection can be validated only after evaluation of the various materials and equipment has been done. Evaluations may be made by methods of comparison.

Making comparisons is one method of analyzing. Comparative data are not readily available in this field. In order to make comparisons it is necessary to analyze each piece of material and each piece of equipment. This process of analyzing to obtain comparative data entails many factors.

Factors such as physical characteristics of size, weight, costs, upkeep, and availability are important. Functions and manipulative factors must be considered, as well as mechanical features involved. Further consideration must be accorded to the teaching procedures. Due care must be observed from the standpoint of pupil interest, accelerated learning, retention, and motivative resultants. Behavior patterns on the basis of attitudes, discriminations, changes, and other character building attributes must be included.

Subject areas and grade levels determine suitability of materials. Curriculum relationships must be clearly indicated at all times in order to justify the use of audio-visual techniques. Basically the learning processes are the same on every level, but various materials are suitable for different components. Analyzation is necessary on this basis with all media encountered.

The problem is complex. Criteria must be established. This thesis is based upon a literary research. The criteria have been carefully appraised upon findings, experimentation already done, and class work done by senior and graduate college students. Against the criteria a method of measure or checking has been placed. Checking for negative or positive findings determine worth of material or equipment to an individual teacher.

To determine validity, the advantages and disadvantages of usage have been listed. Possible substitutions have been listed for both material, equipment, and teaching techniques wherever possible. Because of the complexity of the problem, it was found necessary to cover as many applications in the field of audio-visual education as time and physical determinants allowed.
The final chapter contains suggestions, recommendations, and conclusions. Discussions on ways and means of obtaining motivation of teacher training, the need for more specialized training in the field, and objectives of teacher-training courses are given here. Methods of training for individual teacher evaluation of audio-visual materials, selection of equipment and material based upon these evaluation procedures are set forth. The present handicaps are outlined for course content, teacher certification, and teacher-trainers in audio-visual education. Criteria has been offered for coordinators and directors in the area of audio-visual work. Areas in research for further investigation into audio-visual education have been suggested.

The bibliography consists of forty-nine selected reference books and other sources of information required to complete the work.
EVALUATIVE CRITERIA FOR AUDIO-VISUAL MATERIALS

by

RUSSELL HAYS BLANCHARD

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EVALUATIVE CRITERIA FOR AUDIO-VISUAL MATERIALS

CHAPTER I

STATEMENT OF THE PROBLEM

At the present time there is virtually a flood of audio-visual materials available in the educational field. These come not only from the commercial sources but also from educational institutions and audio-visual centers all over the nation.

How can the teacher select, or even go about making a selection, of appropriate and worthwhile material? Admittedly he cannot wade through the maze of materials to personally preview or pre-listen to such for he would have not a moment left in which to teach.

The problem confronting the classroom instructor today is that he be able to place quickly some type of yardstick beside the form of audio-visual aid he believes is useful. He must have some type of check sheet or table against which he may determine the probable value of many factors. This form must necessarily vary according to the material under consideration. It is evident that maps could not be judged by the same criteria as a sound, color motion picture, even though they might conceivably be used almost for the same ends or objectives.

The present problem is defined as: what audio-visual aid should be selected and how should it be selected in order that it may give the utmost effectiveness when used in a teaching situation? It is not the writer's intention to disclaim the existence of measuring devices for
this particular function. It is set forth, however, that such evaluation devices as do exist are sometimes not up to date, or that they are not set up to meet the present objectives. Perhaps those offered in this study will not bear the test of time ten years hence. In the event they are outmoded by technological advancement and pedagogic changes, then that is good. Progress in our methods can the more easily be discerned.

PURPOSE OF THE STUDY

The following study has been made for the purpose of determining concisely the factors which will be used to gauge the "value" of the various media, mechanical devices, and techniques of teaching employed with audio-visual methods.

The primary purpose is a descriptive research of surveys and critical analyses of the latest available data in printed form. This is valid only in respect to the conditions which have led to the present acceptance and interest in the field of audio-visual aids. Therefore, it is necessary to follow the trend (in historical significance) reviewing the records of the past. As the title indicates, this thesis is developed about a critical evaluation of a unitary group of material, with interpretation in terms of comparisons employing reflective thinking. These analyzations form the basis for grouping of factors into values which can be weighed against present educational objectives.

The value of the studied results will enable educators to check the effectiveness, the utilization, the objectives, and to what extent
each can be obtained.

Throughout the work continued reference is made to curriculum content relationship. Were this not done, how could educators possibly justify the present audio-visual program, the increasingly large appropriations made by the states, counties, and local school districts, or the courses of study offered in the teacher-education centers?

**Summary of the Purpose:**

1. To compile evaluative factors in known educational terminology, on as many audio-visual materials as possible.

2. To arrive at these factors by analysis of the findings of other researchers in the field.

3. To add to the criteria thus found that which has become evident from teaching college courses in audio-visual techniques.

4. To compile these findings in concise form for the reader to check against.

5. To motivate the seeker toward further thinking on this subject and its educational implications.

**PROCEDURES USED IN OBTAINING DATA**

It was necessary while compiling this material to fall back upon the results of surveys and tests made (for the most part) under grants and foundation loans. These studies furnished the basis for pages of reports on trial and error experiments. Results were usually tabulated, and conclusions drawn. The danger point always occurs when the summary or suggestions for improvement have been reached, only to realize the conditions under which the survey in question was undertaken are already out-dated. Thus, timeliness has been the greatest variable encountered.
The total gamut, as far as possible, of the various audio-visual teaching aids encountered at present have been included, acknowledging omissions and shortcomings because of physical limitations. In some places only a mention has been made, where similar techniques or methods are available for comparison.

DEFINITION OF TERMS

The term **evaluative criteria** means a set of tangible factors against which the amount of value can be objectively measured. Intangible, subjective measuring has no value here.

When using the term **tangible factors**, the connotation is meaningful only when a definite answer can be given. This may be accomplished by expressing a positive or negative opinion, a combination of percentages, or a progressive series of words such as fair, good, excellent. The "tangible factors" therefore become the criteria or the standards against which the various values of the teaching aids are judged.

An **instructional or teaching aid** is any device that will assist the instructor in more easily transmitting desired information to the learner. The objective of the instructor's presentation, whether it be to impart skills, knowledge, information, attitudes, appreciations, backgrounds, or other aims to the learner, is the primary part and parcel of the factors mentioned above. It is with these criteria (plus the physical aspects) of the teaching devices that we are concerned.

A **visual aid** is any instructional device which can be seen, but does not give sound. A chart or poster is an example of a visual aid; the bulletin board or a photograph are others.
Audio aids are those which can be heard and in most cases can be seen, but the viewer makes little connection between the source of the sound and the auditory experience which is taking place. The radio is an example of the audio aid in the strict sense of the word.

Auditory usage is usually necessary for maximum effectiveness when visual aids are employed. It seems this fact is not fully recognized.

An audio-visual aid is one which employs both of the learner's sensory facilities, seeing and hearing. This is usually synchronized in action and frequently comes from two sources, although they may be combined in the same mechanism. An example of this type is the sound motion picture, a television performance, or a teacher giving instructions while performing a manipulative demonstration.

The present concept of the words "audio-visual" include all instructional devices whether they contain either of the component parts, and it will become more and more evident that there is usually some part of one entering into the educative process when the other is employed.

Audio-visual in the present sense will therefore encompass any and all types of teaching aids, and no distinction will be made between the two except where certain physical characteristics are to be examined.
CHAPTER II

HISTORICAL BACKGROUND OF AUDIO-VISUAL EDUCATION

In all probability visual education began during the Stone Age when man carved crude pictures on the walls of caves. However crude, this was a representation of ideas in pictorial form.

In ancient India, sand was used by the teachers when instruction was given in the ancient Aryan language of the Hindus and that of the Vedas. Problems and equations were also done in sand by the students.

The first transition from pictures to writing appeared in the Egyptian hieroglyphics. The first of the Egyptian hieroglyphics appear to have been only a series of pictures, which were gradually changed to make possible more rapid writing.

The Chinese in the meantime used a pictorial form of representation when they utilized the scum that floated to the shores of their lakes which resulted from reeds grating together in the breeze. This froth was spread evenly and allowed to dry and thus became their first paper.

Moses appeared on the Mount with tablets engraved with Jewish characters and the inscriptions have lived to this day. The use of the demonstration by the greatest teacher of all times is well-known by all who are acquainted with the teachings of Jesus of Nazareth. This man, the greatest of all prophets, had a class of twelve men whom he instructed through the method of doing. His ways are familiar to all.

Ritchie (40, p.17) tells us of the next development as: "The basic idea underlying the cinematograph, upon which all modern pictures
are based, was developed by Lucretius (98-55 B.C.), who, in his book 'De Rerum Natural', pointed out the phenomena of 'persistence of vision'.

Ptolemy (127-205 A.D.), a Greek philosopher, wrote a series of books in 150 A.D. In these books on optics he described a simple apparatus by which images could be made to appear to be moving.

Next in order followed the so-called Dark Ages, which is roughly the earlier part of the Middle Ages. That period was so labeled because of the intellectual stagnation. Immediately following this age, visual education as a teaching method reached an apogee.

Some of the contemporary leaders in audio-visual education date the birth of audio-visual education from 1456, the year ascribed to the great achievement of Johann Guttenberg's invention in Germany. Credit is commonly given Guttenberg for the invention of movable types; yet it is known that the Chinese used movable types of clay in the eleventh century, followed by tin types strung on wires and by individual wooden types, a kind still used.

During the three centuries, 1450 to 1850, the art of wood and metal engraving by hand constituted the chief medium of illustration. As designs became increasingly more elaborate, the skill of the engravers kept pace, but a more suitable base was sought; thus, metal gradually replaced the wood, and etchings of metal came into being. Maps for printed books were hand engraved as early as 1478.

Between 1500 and 1600 there began to appear philosophers who decided there should be more concreteness in the field of teaching. One of the early exponents of this was Johann Valentin Andrea, who
suggested that painting, pictures, and diagrams should be placed upon the walls of the rooms in which students were taught.

Of the great reformers of that period, Ritchie (40, p.17) says: "In the seventeenth century there was a wide use of visual materials in medicine, physics, and astronomy". Francis Bacon (1561-1626), the English philosopher and author, advocated the use of objects for teaching purposes. John Amos Comenius (1592-1670) has been credited by historians of education as being the fount of visual education in both theory and practice with his book "Orbis Sensualism Pictus". Actually, says Baardeen (11, p.146), "... nothing is further from the truth.

The orbis pictus may or may not have been the first illustrated book devoted exclusively to children, but in either case, Comenius employed a technique and an educative medium which had been in common use since the beginning of printing".

Wolfgang Ratke (1571-1635), the famous German educator, lived in Holland between 1603 and 1611. He was the inaugurator of a new plan of school reform. The essence of his system was to discard the old memory and rote method of teaching, and in place of this to teach children by interesting them in presenting things for their observation. He met with little success, but his views had a great influence upon those who followed his footsteps.

An English philosopher, John Locke (1626-1704) followed. His greatest contribution was an essay on human understanding. Locke visualized the human intelligence as a blank sheet of paper upon which life and experiences made their imprints. One of his theories was the importance of using pictures to gain the most effective
In a paper written in Paris, 1880, entitled "A Critical History of the Doctrine of Education in France", there is a detailed account of the methods employed by the Jansenist, Pierre Nicole (1625-1695), in teaching at Port-Royal. Nicole taught history and geography with the aid of maps, pictures, globes, flashcards, and other devices. He insisted that children should be instructed always by giving appeal to their sight and hearing. This seems to be the first specific reference to both the audio as well as the visual, when instruction is given.

The Abbe Nicolas Lenglet du Fresnoy (1674-1755) was a product of the schools of Oratory which flourished immediately after the Jesuits. The oratorians were the most powerful teaching order in France and controlled the entire educational system of France until the Revolution. Although an inept politician, Abbe Lenglet was a renowned history and geography instructor. He claimed that children learned more readily when they employed three senses — hand, ears, and eyes.

The renowned French philosopher, Jean Jacques Rousseau (1612-1778), wrote on the training of the senses, stressing the fact that one must do this in order to learn how to touch, to see, and to hear. This he termed objective teaching. The plan was to begin with the training of the senses in early childhood and then proceed with the development of the entire child.

Near the close of the seventeenth century in America, "The New England Primer", a picture alphabet, was published. This was in the form of religious jingles. In 1710, there followed in England another textbook called the "London Spelling Book", which was profuse with
pictures of the tree of knowledge as well as an illustrated alphabet. The "New Guide to the English Tongue", printed in 1740 by Dilworth, included illustrations of various sayings such as: "A bird in the hand is worth two in the bush".

Johann Heinrich Pestalozzi (1746-1798) carried out experiments in his school at Burgdorf. He believed the sense of perception was the most important sense used in the learning process. Pestalozzi carried out his work with the use of objective materials in teaching geography, history, art, modeling, and natural history.

Some of the great educators who helped develop and promote the use of the audio and visual in their teachings were: Johann Heinrich Basedow, who advocated among other items the inclusion of models; Johann Friedrich Herbart (1776-1841), who investigated the use and application of models in teaching geometry, trigonometry, and art; Fredrich Froebel (1782-1852), who continued this work and established the first kindergarten at Burgdorf in 1840. Froebel relied on sense perception to teach color, form, and dimension.

In 1838, Horner invented a toy called the "Cycle of Life", which gave an optical illusion that was the beginning of actual moving pictures. This consisted of a hollow cylinder, a turning wheel, and a little booklet of pictures, the leaves of which were released one by one, thus giving the impression of motion.

Dr. Sellers developed the kinematoscope with which he showed a series of photographs as early as 1861. On May 4, 1897 at the Bazar de la Charité, in a booth at one side of the auditorium, to which no one paid attention, a man demonstrated an invention called the
"cinematograph".

Edward Muybridge of England made the zoopraxoscope with which he projected moving pictures on a screen. Thomas Edison (1847-1931) invented his kinetograph which was the forerunner of the modern moving picture camera.

The famous hornbook gave way to Webster's blue-book speller, and later to the McGuffey Reader. The three R's were the real backbone of the curriculum and visual education was an extra-curricular activity consisting of out-of-school experiences.

The first course in audio-visual techniques was offered on a college basis in 1921, and at that time the title still was based only on the visual. In 1936 approximately 400 schools and school systems in the United States employed full-time and part-time directors for visual education. Selection and use of visual aids was then given in only 100 or so out of the 1200 teacher-training institutions across the nation.

It was not until 1915 that any attempt was seriously made to form an organization for the purpose of bringing about a better understanding of audio-visual usage. In that year a national organization was set up, but soon went out of existence, to be followed by the National Academy of Visual Instruction.

In 1923 the Department of Audio-Visual Instruction of the National Education Association was formed. The growth of the organization has been slow but it has gradually assumed an important place in the educational system of America. It is interesting to note that this department (now known as the DAVI, Division of Audio-Visual Instruction)
has clearly established its policies only as recently as February 1952.

The motion picture has been one of the most outstanding contributions to visual education. During World War I, silent films were in use in classrooms. Slightly earlier, filmstrip projection was introduced into educational circles.

During the period of World War II, visual and auditory aids were used to train thousands of servicemen in all branches of the armed forces. Mock-ups of the parts and functions of many mechanical devices were frequently utilized. Motion pictures aided the teaching of all types of landing and attacking techniques. Many newer applications were the result of intensive training and research on the part of the government and the men employed from education.

The result of this tremendous interest during the war period brought about much agitation for a "visual education movement" in 1945. In 1946 and 1947 military training specialists and trainees alike began returning to schools. These men were habituated and already grounded in audio-visual techniques, which caused a rapid expansion in the use of these A/V aids. By 1947, required courses in audio-visual education began to be popular with the various states as part of the required curriculum for teacher certification.

The future of audio-visual cannot be determined as yet. It will increase the depth of experiences and broaden the scope of the students so that concepts will become clearer and more understandable. It is making rapid strides toward this realization, especially so in light of the scientific advancements of electronics and through its popularity.
with educators as the fundamental basic principles become more fully understood.
CHAPTER III

THE PROBLEM OF THIS STUDY

BASIC FUNCTIONS TO BE EXAMINED

Audio-visual materials are used for one purpose, to induce more comprehensive learning in a shorter period of time. Kinder (28, p.336), in defining the term visual education, tells us it is "... used to identify representational and experimental materials and techniques which in one way or another are used in every effective school to clarify and intensify the learner's mental images of the object, process or event being studied". If this is accepted as true, then a method of placing an evaluation upon the aids is to determine the relative effectiveness which they will contribute to the end result.

It has long been recognized that a unit of learning will be imparted only as well as the teacher has that ability. Audio-visual materials will not function, whatever their nature, without a trained teacher in command.

From the foregoing, it appears there are factors which go hand in hand: the trained user of aids, a good aid to help him, and the function of that aid. Function becomes one of paramount importance. Separately, each piece of material must be examined whether it be a chart, poster, textbook, or film. In order, therefore, to measure the effectiveness of an aid, the function of the material in light of the wanted objective is discussed. From that, resultant deductions can be made objectively. Subjective evaluation will be of little value.
Curb-stone evaluations cannot be directly set down on a table for objective testing and checking.

It has been shown that the most effective type of aid is one which has been made specifically to satisfy a certain condition or situation. The trained instructor realizes the need for good teaching materials to overcome certain difficulties encountered in all presentation. It is this tool which is designed to do a certain work in bringing the idea, concept, or relationship into a fuller understanding and with a saving of time. The aid then should fall into one or more classifications of the following basic functions:

1. To explain an abstract idea or principle.
2. To clearly show relationships.
3. To give sequence of procedure or operations.
4. To upgrade standards of workmanship.
5. To show materials, structure or reactions.
6. To enlarge or reduce, for clarification.

If the material has one or more of these qualities which contain the means to obtain the correct application, then it is acceptable. However, to be used successfully as a teaching aid, it must have characteristics to fit the classroom conditions and situations. These desirable factors that audio-visual materials should possess can be listed; they form the basis for the first set of evaluative criteria.

**PHYSICAL CHARACTERISTICS OF A/V MATERIALS**

1. Large enough to be seen by the entire class and no larger.
2. Lettering or writing should be given careful consideration.
3. Colors should be used with due caution, all people do not see color alike.

4. The psychology of color must be taken into consideration. Factors such as the exciting emphasis of red or the passiveness of green contributes to the effectiveness of learning.

5. Relationships of ratio and proportion should be maintained in order not to confuse the student with previously learned concepts.

6. A high standard of workmanship is necessary to eliminate the competition of other diversions.

7. Terminology should be on the learner's level. Comprehensions should be automatic, not blocked.

8. Layout, balance, and proportion must be employed for emphasis, clarity, ease of eye travel and retention of the basic, desired elements.

Let us not be deluded into thinking that commercially developed and prepared audio-visual aids have those qualities listed above. Indeed, many of the types offered to instructors as teaching devices fall previously short upon exacting inspection; on the other hand, many of the most effective teaching aids now in use have more than several of these physical characteristics.

METHODS OF EVALUATING

It is one thing to visualize objectives, but to put these objectives down on paper becomes a concrete or "doing" action. Most teachers are not concrete thinkers and can perhaps function more easily (certainly with greater speed) when the objectives have been outlined and set down for them.

On the preceding pages have been set down eight factors dealing with physical characteristics. The question now arises: Suppose it is not possible to become familiar with or to check on the points already
studied? In the case of a piece of material ordered to fit into a certain unit of work and it has not arrived, how could any criteria be set up? The following seems to be the only practical way to do this:

1. Check available descriptive literature or catalogs.
2. Solicit recommendations of previous users.
3. Check with the director of audio-visual materials.
4. Check with the school audio-visual coordinator.

Immediately upon arrival of the device ordered, try to find time to preview or pre-use it at least once. In this preview period certain conditions should emerge; these conditions or teaching factors can readily be checked against a prepared form.

What about forms? Many and various forms have been worked out by teacher-training institutions, individuals, and authors of books on audio-visual education.

The material offered in this thesis contains sets of various check-sheet types of criteria. Some of these have been presented in tabular form for the purpose of giving clear-cut pictures of the progression factors involved.

Certain factors will enable an instructor to select, and retain or discard an aid for classroom use. If certain desired factors do not exist in the wanted quantities, or in slightly different form, they can readily be manipulated to suit the situation. These factors must be brought to light and organized so the user has a "controlled situation" at all times.
ARE THESE CONDITIONS Fulfilled?

1. Is the sequence adapted to the present unit or course of study?

2. Is the unit small enough to digest without complications?

3. Is the learning on the proper level for the grade or class?

4. Is the presentation logical and ordered?

5. Is the material outmoded or up-to-date?

6. Can the accuracy or technical aspect be questioned?

7. Is the aid complete as to clarity and understanding?

If these points are checked to the satisfaction of the user, then with proper presentation there can be but one answer — the desired result should be gained. However, it would be a deplorable waste of time to duplicate the effort of evaluating anything, or go through the same procedure each time a device was contemplated for use. It therefore becomes a necessity to have some type of recorded findings available for the future.

After examination of what is contained in the device, in the light of sound and correct construction as given in the seven points above and by determining if it will fit properly into the teaching situation, the next step is to find out what that particular aid will do for the learner.

Critically examine the purpose of the aid; what was it specifically designed to accomplish? This accomplishment may be set down as a percentage which it contributes (see chart "Evaluation for Motivative Content" at the end of this chapter).
SIX BASIC PURPOSES OF AN AID

1. Develop interest and judgment of the student.
2. Explain or demonstrate.
3. Help create a desirable attitude.
4. Introduce a subject for consideration.
5. Assist in creating a background for a subject.
6. Show conclusions or summarizations.

Many of these criteria cannot be found within the device itself, for there is still a long way to go for perfect production in audio-visual work. Decided progress has been and is being made; furthermore, research on how to accomplish the very elements studied here has brought to light many factors not thought of in connection with the teaching procedures in the earlier days of audio-visual techniques.

LEARNER RESULTANTS

In order to obtain a proper evaluation of materials, it is necessary to test their relative effectiveness with the result of accomplishment. The teacher can go only so far in determining if the basic functions are present, that the material has the physical characteristics necessary, or the proper learning conditions are present, and if the purpose is suitable. If the learning is not easier, more rapid, and retention is not more permanent, then the aid can be dispensed with entirely.

Further check after a teaching unit has been given is always good pedagogic procedure, whether teaching aids have been employed or not.
These are usually in the form of tests, check-ups, manual applications, and others of similar nature. In checking for motivations, it is not intended they assume proportions of research with percentages gained over the conventional methods of teaching without an aid, but some notation must be made in order to give the audio-visual tools a fair evaluation.

To summarize the points of evaluating a teaching aid by the results obtained, the two most important criteria upon which objective scoring may be used are:

1. Amount and type of student reaction with usage.
2. Amount and length of student learning and retention.

TEACHER-STUDENT EVALUATIONS

One of the newer methods of evaluating done by the more progressive instructors using audio-visual techniques successfully has been the utilization of a combination teacher-student committee. Reactions of students to inherent values of certain materials throw an entirely different light upon many preconceived values set up by teachers. The surprising appraisals made by students indicate factors selected which were not in many cases even meant to be stressed. Further, other factors not discovered by the teacher in either selection or evaluation for definite objectives are sometimes pointed out by students. Insofar as the student reaction is not constant but dependent upon the grade level, the age level, the subject content, and the method of presentation as well as the specific material at hand, no attempt is made here to set them down.
TEACHER EVALUATION OF MATERIALS

The motivation and the resultant stimulation of the student have just been reviewed, but what are the factors involved which will complete the final weighing of materials?

First, necessary steps must be taken to find out in some measure just how helpful or useful the materials were to the teacher concerned. The ease of teacher manipulations, as well as the personal enthusiasm which the instructor has for the particular aid has a great deal to do with its success or failure.

Many items lend themselves naturally to ease of manipulation. They literally blend into the course of study or the unit. Others require more digging into the preparation of the inter-correlation of the aid with presentation. This factor, which may be termed very simply "preparation required before use" should be determined. Later, in the final capitulation of the forms under the heading "Evaluation For Teacher's Role" an opportunity is provided for checking on a percentage basis of 25, 50, or 75%. It is conceivable that this preparatory work might reach to the nineties or perhaps in rare cases 100%; but once done, this work of evaluation need not be repeated for a given aid.

Here are the two vital factors the trained teacher in audio-visual techniques would wish to know:

1. Usefulness of the material in question.

2. Preparation required before using it with a class.
ANALYSIS OF ACADEMIC SUBJECT MATTER

This section deals with a specific subject field. As the study of "social studies" is one of the major interests and required almost universally in all schools today, an examination of this subject field will be used for illustration. The entire scope of social studies should be formally set down to determine if the aid will accomplish one of three things: does it (a) emphasize, (b) merely include, or (c) entirely leave out such factors as those shown in the chart at the end of this chapter entitled "Evaluation for Subject Content".

It is not the intent to set up a rigid declaration of pedagogic factors in the social studies field, but merely to offer a guide showing how a social studies teacher could obtain a valid evaluation of audio-visual devices. In obtaining clarity, it is desirable to go deeper into the various ramifications and implications.

Concepts are possible in analyzing the subject. They may be given consideration according to a greater or lesser degree. Although the following classification is rather lengthy, there still remains a decided advantage in giving it consideration. While not set down verbatim and in its entirety, this excellent organization (4) was developed in 1938 for the use of the teachers of social studies in Yolo County (California) in conjunction with the United World Films:

1. Does the student understand the family as a social unit?
2. Does the student understand providing balanced personalities by forms of recreation, love of beauty, technological advancement, etc.?
3. The four freedoms and social well-being must be planned?
4. Environment requires adaptation for effective living.
5. Value of past achievements for future planning.
6. Universal freedom from want with technological development.
7. Increased interdependency implies responsibility to democracy.
8. Understanding economic balance maintained through consumer education.
9. Understanding of democratic group action and leaders.
10. Understand possibility of mental, moral and physical growth.
11. Appreciation of the freedoms and justice for all.
12. Recognition of the interdependence of all forms of life.

ANALYSIS OF INDUSTRIAL ARTS SUBJECT MATTER

The same procedure as done with social studies in analyzation may be used in the field of industrial arts. It becomes apparent that the same process of delimitation must be employed. There was no inference in the previous breakdown that it was designed for any particular grade level. In order to narrow the field to a single subject, the courses now offered in the field of graphic arts will be considered. The breakdown is equally effective in principle to any of the other subject areas that involve manipulative skills combined with their related subjects (English, mathematics, history, etc.), and their related sciences such as chemistry, electricity, and physics.

Scope of Industrial Arts Printing

- Exploration: (investigation of the trade)
- Manipulation: (basic skills of the trade)
- Socialization: (individual and group effort)
- Production: (individual and group effort)
- Organization: (results of planning)
- Creation: (expression in art forms)
Scientific (technological development)
Academic (written forms, usage of English)
Mechanical (relation of machines to the social order)

On further analysis these factors fall into the following classifications:

1. Is the student given the opportunity of obtaining a broad overview of the graphic arts field including the principles of printing, the apprenticeship system, and the trade unions?

2. Is the opportunity present to gain manipulative skills in type setting, letterpress reproduction, and use of various hand tools?

3. Do classroom conditions provide the opportunity for individual and group planning, demonstration of leadership, self-evaluation and discipline, and realization of individual's responsibility?

4. Are concrete projects contributing toward enriched personal life, sense of achievement, feeling of being necessary, ability to use skills of measuring and calculations?

5. Is the unit of study directed so that the student has a part in planning, may discover his own aptitudes, realize knowledge of organization to production, and understand his own contribution to the over-all plan?

6. Are sources and materials available to promote the realization that all concrete things are the result of visualization, understanding that knowledge versus trial and error methods, realization that good design is not happenstane?

7. Does the student understand that technological developments contribute by knowledge of history, English, basic art forms, social studies, ethics, mathematics, mechanical drawing, chemistry?

8. Can the student see how education contributes to personal development by knowledge of history, English, basic art forms, social studies, ethics, mathematics, mechanical drawing, chemistry?

9. Is implication of machinery to the working man shown by greater freedom, more returns, safety factors, required operation, care and knowledge, increased health, comfort, and enjoyment?

Proper procedure in using audio-visual aids includes previewing.

For instance, a sixteen inch radio transcription may take half an hour to listen to, and no teacher would present it to the class before
hearing it at least once. After that comes the study of the guide or manual, if one is furnished; then a good lesson plan which will take more time. After this preparation period, the aid is ready for presentation to the class. If the contribution of the aid is not in line with the time spent upon it, then its worth is questionable.

The student is the next consideration. An alert teacher observes the reaction of his students. After using the aid, a good discussion should follow in which the amount of knowledge obtained is brought forth: was it fair, good, or excellent? How much of the unit was retained? Was the aid useful in bringing about the desired objectives? A check-up or test will reveal whether or not the worthwhileness of that particular tool was valid. The teacher should actually know these things, not guess, and he can do it by making a valid check. For this purpose another form has been set up wherein certain values may be circled. It is the form entitled "Evaluation for Teacher's Role" and is the third appended at the end of this chapter.

No matter what the subject, no matter what grade level the teacher happens to be working upon, the basic duty of all educators is to work toward the creation of desirable attitudes. Subject content is the medium with which all teachers work. The techniques and methods of using content make good or poor teachers. Applications correctly used in respect to bringing out lessons in attitudes, concepts, and relationships mark the better teachers. Socialization is a hard thing to define in a teaching aid. It is the application the teacher makes which reveals it or hides it.
What the teacher wishes to know in regard to this quality is how much gain the student has shown after exposure. This is a difficult item to measure, especially with large groups of students. It can be determined (though not as accurately perhaps as in a case study) upon the basis that some effect has taken place and some improvement can be noted.

EVALUATION OF SPECIFIC DEVICES

As many schools are limited by not having access to all audio-visual equipment and many teachers have not had the opportunity to become acquainted with certain phases in the use, selection, or operation of the various devices, it is necessary to break down the field of audio-visual materials into certain categories which may be more easily studied for their potential possibilities.

Grouped according to their physical characteristics, the audio-visual materials fall into the following classifications.

<table>
<thead>
<tr>
<th>Physical Characteristic</th>
<th>Classification of A/V Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Flat materials</td>
<td>h. Classroom maps</td>
</tr>
<tr>
<td>a. Graphs*</td>
<td>i. Instruction sheets</td>
</tr>
<tr>
<td>b. Charts</td>
<td>j. Study prints</td>
</tr>
<tr>
<td>c. Diagrams</td>
<td>k. Flannelboards</td>
</tr>
<tr>
<td>d. Cartoons*</td>
<td>l. Bulletin boards</td>
</tr>
<tr>
<td>e. Posters</td>
<td>m. Technical tables*</td>
</tr>
<tr>
<td>f. Flash cards*</td>
<td>n. Flow charts*</td>
</tr>
<tr>
<td>g. Manuals and guides</td>
<td></td>
</tr>
</tbody>
</table>

II. The Chalk Boards

a. Blackboards
b. Special boards*
c. Types of chalks
d. Fluorescents*

*These materials or machines have not been evaluated in this thesis.
III. Books
   a. Textbooks
   b. Reference books
   c. Picture books*
   d. Comic books*

IV. Projected Materials
   a. Motion pictures
      1. Silent films
      2. Sound films
      3. Color films
      4. Feature films
      5. Documentary films
   b. Microprojection
   c. Filmstrips
      1. Silent filmstrips
      2. Sound filmstrips
   d. Lantern slides
      1. Commercial types
      2. School-made
      3. Photographic*
   e. Slide projectors*
   f. The ophthalmograph
   g. The tachistoscope
   h. The opaque projector*
   i. The overhead projector*
   j. Projection screens*

V. Eye Training Aids
   a. Stereoscopic materials
      1. The stereograph
      2. The stereoscope
   b. The telebinocular
   c. Reading accelerators
   d. The metronoscope
   e. The microscope*
   f. Other aids

VI. Bulk Materials
   a. Globes
   b. Models
   c. Dioramas
   d. Mock-ups
   e. Specimens*
   f. Sand tables*

VII. Audio Materials
   a. Radio (AM & FM)
   b. Recordings
   c. Transcriptions
   d. Television
   e. Tape recorders
   f. Microphones*

*These materials or machines have not been evaluated in this thesis.
VIII. Activity Materials*
   a. Demonstration (teacher)
   b. Demonstration (learner)
   c. Dramatics (spectator)
   d. Dramatics (participator)
   e. Field trips

With an adequately developed check list the individual teacher can quickly distinguish difference in application and thus decide without much hesitation which medium will aid in obtaining the desired result. Bearing in mind that all the factors presented thus far are basically desirable in all devices, the next step is to thoroughly evaluate equipment or material. Checking will help the teacher make a decision on the actual worth of a particular aid and its contribution to a given unit of instruction.

*These materials or machines have not been evaluated in this thesis.
### EVALUATION FOR SUBJECT CONTENT

<table>
<thead>
<tr>
<th>Scope of the Social Studies</th>
<th>Rate by approx. per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Conservation (natural &amp; human resources)</td>
<td></td>
</tr>
<tr>
<td>Production (of goods and services)</td>
<td></td>
</tr>
<tr>
<td>Distribution (of goods and services)</td>
<td></td>
</tr>
<tr>
<td>Transportation (of goods and services)</td>
<td></td>
</tr>
<tr>
<td>Communication (in its various forms)</td>
<td></td>
</tr>
<tr>
<td>Religion (understanding concepts)</td>
<td></td>
</tr>
<tr>
<td>Tolerance (understand implications)</td>
<td></td>
</tr>
<tr>
<td>Recreation (provision for leisure)</td>
<td></td>
</tr>
<tr>
<td>Government (provision for freedoms)</td>
<td></td>
</tr>
</tbody>
</table>

### EVALUATION FOR MOTIVATIVE CONTENT

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Check or circle appropriate rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>Give a background</td>
<td></td>
</tr>
<tr>
<td>Introduce a subject</td>
<td></td>
</tr>
<tr>
<td>Develop interest</td>
<td></td>
</tr>
<tr>
<td>Promote judgment</td>
<td></td>
</tr>
<tr>
<td>Give information</td>
<td></td>
</tr>
<tr>
<td>To demonstrate</td>
<td></td>
</tr>
<tr>
<td>Create an attitude</td>
<td></td>
</tr>
<tr>
<td>Summarization</td>
<td></td>
</tr>
</tbody>
</table>
EVALUATION FOR TEACHER'S ROLE

<table>
<thead>
<tr>
<th>Title of Aid:</th>
<th>Check or circle appropriate rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preview time required</td>
</tr>
<tr>
<td></td>
<td>10 min.</td>
</tr>
<tr>
<td>Preparation required</td>
<td>25%</td>
</tr>
<tr>
<td>Usefulness to teacher</td>
<td>Poor</td>
</tr>
<tr>
<td>Student reaction</td>
<td>Merely entertain</td>
</tr>
<tr>
<td>Student learning</td>
<td>Poor</td>
</tr>
<tr>
<td>Student retention</td>
<td>Poor</td>
</tr>
<tr>
<td>Student check-up</td>
<td>Poor</td>
</tr>
</tbody>
</table>

EVALUATION FOR ATTITUDE GAIN

<table>
<thead>
<tr>
<th>Possible factors to emphasize; was expected result obtained?</th>
<th>Check before and after use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No effect</td>
</tr>
<tr>
<td>Self respect</td>
<td></td>
</tr>
<tr>
<td>Social attitude</td>
<td></td>
</tr>
<tr>
<td>Scientific attitude</td>
<td></td>
</tr>
<tr>
<td>Cooperation</td>
<td></td>
</tr>
<tr>
<td>Responsibility</td>
<td></td>
</tr>
<tr>
<td>Creativeness</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER IV

EVALUATION OF SPECIFIC DEVICES IN A/V EDUCATION

FLAT MATERIALS

All materials produced or reproduced on a flat surface may well be placed under the convenient term of flat materials. These may include for our purposes sheets from tissue paper thickness or cloth limpness to heavy cardboards, even plyboards which will sustain their own weight when displayed.

It must be realized that flat materials have certain limitations. Flat pictures can often be misleading unless the student can readily visualize the meanings of tone and shadings. This last statement is particularly true in map comprehension. Heiss, Osborn, and Hoffman (23, p.161), in speaking of flat pictures, affirm "Flat pictures have but two dimensions. They lack depth, which sometimes gives the pupil wrong initial concepts". Mary N. Bartlett, co-author with Arthur I. Gates of the manual for a well-known reading series, (5, p.13), takes the opposition by attesting, "The child who has arrived at this typical stage (fifth year age) of familiarity with pictures has learned to interpret the chief conventions of pictorial representation. He recognizes a two-dimensional black and white line drawing as a comprehensible reproduction of three-dimensional colored objects which he has met in daily life". In order to obtain, if the first hypothesis is correct, the desired third dimension, the teacher would have to resort to specimens, models, mock-ups, and objects, which in itself often
precludes consideration because these items are prohibitive in cost. Whether this limitation exists is open to debate, but pictures and other flat materials will be used to supplement other teaching devices. The primary concern is to discover by evaluation the best techniques and use of the flat materials at hand, or those which can be acquired easily.

To interpret is the teacher's justification for being before any class. He is the prime factor in successful use of any flat material, as mentioned above. It is the influence of the teacher which counts.

Acknowledging, then, the important role of the teacher in flat material presentation, what factors would the teacher use to grade or evaluate pictures in order that they might serve him most efficiently? What should pictures possess to be used as teaching tools?

Students should and can be motivated by this medium to organize and extend their own interests. It is the function of the pictures or flat materials, with the aid of the instructor, to individualize and to socialize the instruction of the heterogeneous group in his classroom.

The first three sets of criteria, thirty points in all, deals directly with illustrations, photographs, and other pictures.

EVALUATIVE CRITERIA ON PICTURE CONTENT

1. The picture must be clear and well printed.
2. Must be easily understood and on the learner's level.
3. Descriptive material should accompany each picture.
4. Should be permanently mounted to withstand wear.
5. Should be mounted to fit into an opaque projector.
6. Should be cross-indexed with other teaching aids.
7. Must have accuracy and be reliable.
8. Should increase interest and motivation.
9. Consider possible uses of pictures with graphs, charts, diagrams, maps, and other types.
10. Endeavor to have several pictures on same subject showing different applications.

EVALUATIVE CRITERIA IN USING PICTURES

1. List pictures needed in lesson plans.
2. Have them easily available when wanted.
3. Have materials indexed and filed for quick reference.
4. Select topics and subject related to the study area.
5. Use only a few pictures with each presentation.
6. Use an easel for showing to best advantage.
7. Employ the opaque machine when available.
8. Make provision for individual study at learner's rate.
9. Do not use regimented methods (passing in rows).
10. Consider use of color for realism and dramatic effect.

EVALUATIVE CRITERIA IN PRESENTATION

1. Make comparisons between two pictures or within a picture.
2. Have continuity or progressive steps illustrated.
3. Make contrasts in pictures and between pictures (antithesis).
4. Draw inferences from visual clues in pictures.
5. Make reinterpretation of student's experiences.
6. Use for new information or introduce a new subject.
7. Deal directly with the problems at hand.
8. Make certain all have understood the objective.
9. Use as a preparation unit.
10. Check for student's observations, inferences, and perceptions.

No consideration has yet been made of the many teacher-made flat materials which are constantly produced in many classrooms and shops. For purposes of clarification, three criteria were analyzed. There appear to be two main points for deciding the worth of these materials. First, there is the function which any tool can be expected to contribute to the teaching process; second, there are the physical characteristics that each separate piece of flat material should possess.

EVALUATING FOR COLOR EFFECTIVENESS

As the use of color is not discussed elsewhere in this paper, a brief mention will be made of it here. The discussion will apply mainly to graphs; however, the same principles may be applied when constructing or considering posters, charts, diagrams, and other flat materials.

Visibility should be considered above all other characteristics in the selection or construction of the various teaching aids. Keep in mind the application of transparent colors (such as cellophane) for projection purposes. Visibility is dependent upon a contrast of values. Experimentation has proven the following have the highest visibility in decreasing order:
Visibility factors have been carried out to fourteen stages, but for purposes here, the first six are sufficient to make evaluations of materials.

One must realize that backgrounds have an effect on color. The same color will appear lighter on a black background than on a white one. The cool colors, blue, green, recede (move away from the viewer). All warm colors have the ability to advance toward the viewer, beginning with red, red-orange, orange, decreasing as they move down the spectrum. This must be taken into consideration when evaluating material to be used for learning purposes.

As this section is dealing with graphs, criteria will be set forth for the use of color involving the pie (or circle) graphs, isometric graphs, line graphs, and area graphs. Applications to other types may be found in these four.

**Pie graphs:** The amount of color used must make up for the varying intensities of light-dark contrast; therefore, colors of stronger intensity (chroma) and higher value should occupy the smaller areas, while colors of weaker intensity and lower value should occupy the largest area. An example of a three-color combination should be: yellow (largest section), grayed green (middle section) and purple (smallest section).

**Isometric graphs:** Intense colors in the warm part of the spectrum will stand out or in front of the hues which are reduced, cool, or the
closely blended colors. Selection of material with this particular characteristic will produce an illusion of depth. This is especially true when used for projection. In this latter case, however, the isometric or receding part of the graph should not only be of the receding color but should also be darker in value.

**Line graphs:** In many cases the use of color for dotted, continuous, broken dot-dash, and center lines is not desirable in line graphs. Clarity is obtained in many cases by using color in this type of graph, but color, when used with black lines, must be wider to compensate for the weight balance. All bands should be of the same intensity of color but not of the same color. Lettering or other descriptive material should not be placed on the bands of color. When wide bands of color are applied to line graphs, the points of the variables should be on the upper edge.

**Area graphs:** In coloring areas on a graph, the lower sections should be darkest in line with a progression to lighter values in the areas extending upward. Intensity of color should not be changed as relative areas will be changed. For example, a large light area in lavender with a much smaller area done in purple will make the smaller area appear to be much more important than it should, because of the intensity of the color applied.

The following analysis of evaluative criteria for charts, posters, diagrams, and other types of flat materials will follow the form of giving the functions and physical characteristics. Certain points must necessarily be duplicated in giving a table of items to be checked. This factor must be included, for when evaluation of one
type is made, the instructor cannot keep in mind all of the factors which apply to the other types.

CHARTS

1. Functions:
   a. Are used to analyze a problem.
   b. Effective in presenting and analyzing certain situations.
   c. May show references and comparisons clearly.
   d. Can be used to show distribution and trends.
   e. May be used in a variety of ways to show summaries.

2. Characteristics:
   a. Illustrations should be used when possible.
   b. All titles and captions should be clearly visible.
   c. All steps of progress should be in proper sequence.
   d. An adequate size paper or board should be used.
   e. Eliminate tendency to overcrowd charts.

DIAGRAMS

1. Functions:
   a. Shows arrangement and relations, as of parts to the whole, relative values, origins and development, chronological fluctuations, distributions, etc.
   b. May illustrate progress or process of any product.
   c. May effectively show the operation of machines or appliances.
   d. Can show construction or an abstract view of the original.
   e. Can explain, represent, show relationships and relative values.

2. Characteristics:
   a. Must be prepared accurately and to scale.
   b. Can be a complicated schematic representation.
   c. Omit non-essential details; use symbols for clarity.
   d. Can be used in connection with more than one chart.
   e. Titles, captions, and descriptive material must be legible.

POSTERS

1. Functions:
   a. Primarily used for display purposes to convey messages or ideas.
   b. May be utilized to create aesthetic or atmospheric effects.
c. Can use charts, graphs, diagrams, maps, pictures, cartoons, or anything which will help present facts or emphasize a subject.

d. Can be used to introduce, present or review a topic or subject.

e. Used for creating interest, quick explanation, specifications.

2. Characteristics:
   a. Emphasize one dominant idea to tell story at a glance.
   b. Make use of illustrations of any type for effectiveness.
   c. Bold vivid colors necessary with brief adequate description.
   d. Must be directly related to the specific purpose or topic.
   e. Should be clear, direct, forceful, and simple.

MANUALS AND GUIDES

1. Functions:
   a. Usually in form of small booklets, folders, pamphlets.
   b. Giving information on a specific object, merchandise, etc.
   c. May be utilized as a teaching device or for student research.
   d. Enables advanced students to obtain greater amount of knowledge.
   e. Gives the teacher extended coverage and further assistance.

2. Characteristics:
   a. Should contain a brief objective test on each chapter or section.
   b. Can be same physical layout as commercially prepared material.
   c. May be commercial, teacher-made or student-made.
   d. Drawings and pictures should be used to illustrate all points.
   e. Sequence and logical organization is the primary factor.

SUMMARY OF CLASSROOM USAGE OF FLAT MATERIALS

1. Has provision been made for convenient and adequate storage?
2. Has good classification and logical order been utilized?
3. Can the flat material be easily handled and displayed?
4. Is the aid durable enough to withstand hard usage?
5. Is the size selected according to paper-manufacturer's standards?
6. Has adequate illumination been planned to show the material?
7. Has an easel or other means of display been provided?
8. Has the correct type of chart, graph, etc. been selected?

The foregoing has been an attempt to evaluate in general the aspects of using these materials in the classroom. There are other factors based upon the physical components of the various flat materials which can be grouped together for evaluation purposes. These bear close scrutiny when determining the suitability of working aids or selection of prepared materials.

CRITERIA ON THE PHYSICAL ASPECTS OF FLAT MATERIALS

1. Is the material well printed and adequately labeled?
2. Is the scale indicated and easily interpreted?
3. Can the aid be easily seen by every student in the class?
4. Has all unnecessary detail been omitted for purposes of clarifications?
5. Are visual symbols such as representative images employed?
6. Is the accuracy well enough defined for its purpose?
7. Can movable symbols and other parts be attached to the aid?
8. Are comparisons, advantages, and disadvantages shown?
9. Are good proportions, balance, and air-bumpers evidenced?
10. Is there any method of covering or uncovering portions?
11. Do complex processes proceed in ordered sequence?
12. Are channels of distribution or flow utilized?
13. Are the illustrations large enough and delimited in content?
14. Are color contrasts and grays strong enough to be easily identified?
15. Is the aid too difficult or involved for the learner's level?
16. Is the line work clean, direct, and heavy enough?
17. Are cutouts (magazine, etc.) used in relative proportions?
18. Is attention attracted at the beginning and maintained throughout?
19. Is there a main dominant focal point used for emphasis?
20. Has originality of thought and design been employed?

In consideration of the workability of the flat aids, evaluation must be further made. Many well-conceived ideas and excellently planned charts, graphs, and posters have become major headaches due to slighting this particular evaluation. Trying to use improper tools and materials can well turn a potential strong user of audio-visual aids into a frustrated teacher.

EVALUATION OF WORKABILITY OF MATERIALS

1. Will the material take all media (India ink, poster paint, etc.)?
2. Material suitable to take glue, paste, photographic mounting tissue?
3. Can drawing tools, projected views, templets, etc. be easily employed?
4. Will background color lend itself to projection transfer?
5. Can the material be cleaned (art gum, kneaded eraser, razor, etc.)?

If the aid is well planned and well executed, make it a part of the teaching tool-kit. A teacher would not think of purchasing a textbook for several dollars, showing one page (perhaps projected on the opaque machine) and then tossing the volume into the nearest waste basket. Yet, when considering the cost of material and time consumed in making
these aids, all too often the life-use may be twenty minutes in front of the class and twenty years rolled up gathering dust. Analyzation of the type given herein should eliminate these costly mistakes and the waste of highly trained time of professional teacher personnel.

In the final answer, the actual results are obtained by the application and effective use of flat material by the individual teacher. His ability to tie in the visual aid with the learning unit will show in direct ratio to the student's gained perception, understanding, and retention. Therefore, as with all of the audio-visual aids, the final test is determined by what happens to the student — this is the measurement of the instructor's achievement. If the above evaluations have been justly considered and used, then the foregone conclusion is improved and an easier teaching situation established.

THE CLASSROOM MAP

The school map is distinctly a tool of the classroom. In order to reach the highest degree of usefulness, therefore, the map must be designed specifically to meet the needs of the level of instruction. It is this dependence upon use which determines the character of the map. The classroom maps function in two manners: (1) for class instruction or testing, and (2) for individual and group reference on projects.

It is necessary to have different types of maps for effective instruction because of the different representations shown. Eldridge (17, p. 398) tells us in this respect, "... the old geography, which taught children to remember facts — mainly political facts — needed
the political map; the new geography which teaches children to think relationships needs the physical-political map which makes evident these relationships". It is for these and similar reasons that there are available Globular, Mercator, Lambert, Gnomic, Stereographic, and the Polyconic as well as other types of wall maps. With all maps there are several primary considerations which must be observed. Not only must they be clear and vivid, but simple and attractive.

The most essential characteristic of any map is the method used to reproduce the effect of relief. Since no map, as a rule, represents a flat area devoid of low and high areas, these areas must conform to the mental ability of the grade level for comprehension. The need for criteria for map selection immediately becomes evident when lower grades must "read" hill shading. A committee, meeting in New York in 1932 under the leadership of Eldridge, reached the conclusion, after much discussion, that (17, p.399) "The hachure maps would rank next in order of difficulty, then the layer maps, and finally the contour maps". They decided further that "much experimenting remains to be done in this direction, however, before the real difficulties of children in interpreting relief can accurately be determined".

There are several classifications which must be made in developing criteria and standards, and these classifications may further be divided into sub-classifications for further scrutiny.

**Considerations for Developing Map Criteria**

1. What is the purpose for which the map will be used?
2. For which level is the map to be used?
3. Will the map be used only for a specific purpose and level?
4. Is the map clear and legible at a distance of twenty-five feet?
5. Is it a general or special map which is required?
6. Are projections designed for understanding on the indicated level?
7. Is the method of showing relief suitable for the grade level?
8. Is the content simple as well as practicable?
9. Is it a special decorative type such as American Folk Ways?
10. Is the map well printed and well labeled?

From the above ten factors, the other detailed physical characteristics can carefully be examined for the criteria involving evaluation. These include such items as the matter of insert maps. Eldridge (17, p.1401) maintains that the "practice of using insert ... maps in the main body of another map is thoroughly unsound and should be abolished. Such inserts merely confuse the minds of most children, and are usually not well understood". Of course, this restriction placed upon maps by Eldridge does not apply to supplementary maps. The further removed from the main map the better, for in effect they become distinct maps in themselves.

**Evaluative Criteria for Content of Classroom Maps**

1. Are the political features subordinated to the physical features?
2. If desired, do parallels, meridians, equator, and like lines show?
3. Are the natural physical features (vegetation, etc.) clearly shown?
4. Are all boundaries clearly indicated on political type maps?
5. Are all other lines (rivers, coasts, etc.) clearly indicated?
6. Have insert maps been kept to a minimum or absent altogether?
7. Have names been superimposed, thus causing confusion?
8. Are all legends and keys and symbols legible in all respects?
9. Is there an actual or approximate standard scale? (Usually 500 miles - one inch).
10. Is it suitable to be used as a basic outline map for students?

Other Evaluative Criteria of Printed Maps

1. Have good visual symbols been used (such as cross hatching)?
2. Are contrasts strong enough to be easily and quickly identified?
3. Has a minimum of variation in significances of color been employed?
4. Has the map been properly dated to protect both author and publisher?
5. Have coast lines (except islands) been continued to margins?
6. Has the map a good clear meaningful title?
7. Is there a good source of data contained on the map?
8. Has it a functional approach such as air-age plane type?
9. Has development such as past, present, or future been indicated?
10. Has type for lettering been selected for maximum legibility?

Proper evaluation of maps indicates that they be introduced on an elementary basis and progress through the grades, becoming more complex as the student gains in knowledge.

INSTRUCTION SHEETS

Before passing on to the next section, a word must be said here of another type of flat material which has aided materially in classroom
instruction. Because of the complexity of the subject, and because there is such an abundance of material upon this particular type of teaching tool, the inclusion here will be merely to signify its importance.

There is hardly a subject area wherein instruction sheets cannot be found in the school curriculum today. They are useful in all subjects not only for the strictly manipulative type subjects, such as home economics, industrial arts, chemistry, but in the more abstract areas as well. Textbooks and workbooks are now frequently employing the process and manufacturers of machinery are adopting the instruction sheet form for explaining operations.

There are many commercially-prepared types of instruction sheets available to educators through the various textbook publishers. In order to select the best type of instruction sheets for student use, a general list of desirable factors should be studied. The following outline form will give a comprehensive over-all picture in evaluating the worth of this teaching tool.

**Psychological Characteristics of Instruction Sheets**

1. There should be only one lesson or learning unit to a sheet.
2. The lesson sheet should look easy to master from the pupil's standpoint.
3. A solid mass of information may frighten a student.
4. Can orient all students more quickly.
5. Clear, well-written sheets encourage the students.
6. Layout should be open and attractive, not cluttered with arrows.
7. At least one illustration to a sheet is desirable.
8. The same order of presentation should be maintained on all sheets.
9. Color may be desirable in illustrations for identification purposes.
10. Some type of numbering should indicate progress sequence.

Types of Instruction Sheets

1. Sheets may be written in any subject area.
2. Instruction sheets may contain directions on how to do something.
3. Informational sheets may contain history, background, orientation.
4. The sheets may contain suggestions by which the student may work out his own ideas.
5. Process explanations may be put on instruction sheets such as making iron, carving meat, making a map, etc.
6. Nomenclature or trade terms as well as tool names, etc., are adaptable for use in instruction sheets.

The above listed material is not inclusive, but merely presents a guide for making a better selection or for the construction of these aids by the individual instructor.

THE FLANNELBOARD

The principle of the flannelboard is not new. It has long been used by parochial schools, churches, and other religious training classes. Education has borrowed this useful teaching device from religion, and the flannelboard is now being used very successfully in a wide variety of ways by schools, commercial and industrial firms, home demonstration agents, and others. The flannelboard can roughly be compared to the bulletin board and the chalkboard, but it has infinitely
greater possibilities as it has some of the qualities and characteristics of both.

The device is known by a variety of names, such as flannelgraph, felt board, flannelboard, story-o-graph, and others. Whatever the name, the principle upon which it functions is very simple.

Enquist and Wagner (18) have made a study at the University of Washington with the flannelboard in relation to teaching small children rehabilitation of speech and hearing disorders. In 1945 they began a search for a teaching tool which would meet certain criteria which they had set up as:

1. It must have appeal to children.
2. It must be flexible enough to provide for individual differences in the rate of learning.
3. It should be adaptable to the level of the child.
4. It must, above all else, be able to stimulate speech.
5. It has to be portable and easily handled.
6. The materials and the device must have durability.

The many teaching tools they had tried out did not meet points five and six in their criteria prior to this date. After the initial trial of the flannelboard, they have continued to use it with marked success.

Areas Useful for the Flannelboard

1. Setting up traffic and safety problems for solving.
2. Demonstrating sewing, upholstering, house planning.
3. Teaching speech to handicapped children.
4. Useful in music composition, reading, and arrangement.
5. To show sentence structure in English and composition.
6. Useful to show number concepts and word meanings in arithmetic.
7. Other areas limited only by teachers' ingenuity.

Children's Reactions to the Flannelboard

1. They enjoy planning and arranging as a learning activity.
2. Participation is possible in all stages of the process.
3. They like to make and cut out the parts for the board.
4. They like to retell and recreate stories of their own interpretation.
5. Participation is stimulated because of interest appeal.
6. Interest is maintained because of ease of handling materials.
7. Associations may be clearly seen, thus learning is affected.

Advantages of the Flannelboard to the Instructor

1. Serves as an "animated" bulletin board or chart.
2. Great flexibility allowed as no set pattern necessary.
3. Rapid use of illustration and arrangement.
4. Possible rearrangement of elements, additions, and subtractions.
5. Any type of material can be adapted to use — teacher-made or commercial.
7. Useful as an intermediate step between abstract and concrete.

After evaluation has been made from the preceding sets of criteria, an instructor may readily decide how the flannelboard can be
adapted to function from the elementary grades up through adult education courses as shown in such subjects as the house planning applications. C. V. Jean, assistant teacher-trainer in agricultural education at Oregon State College, uses the flannelboard constantly for illustrating the abstract factors found in presenting heredity; recessive, dominant characteristics and other phases of the Mendalian laws.

Disadvantages of the Flannelboard

1. Requires a place to store when not in use.
2. Needs a table or easel to adequately show materials.
3. Should have some type of overhead light to gain most effectiveness.
4. Must be made well or hinges pull through light boards.
5. Special care must be taken in attaching material for later removing.
6. First time of preparing materials rather lengthy.
8. If felt is used to any extent the expense is quite high.

THE BULLETIN BOARD

In looking at this teaching tool of wide usage, assume it is merely an overgrown poster containing more elements. It has been used effectively, but what are the purposes of the bulletin board? What can it accomplish in the school or classroom?
Purposes of the Bulletin Board

1. To publicize events, current, local, national, and international.
2. To present new and interesting ideas and information.
3. To stimulate interest in departments, subjects, and school activities.
4. To display skills, knowledge, hobbies, and achievements of students.
5. To continually emphasize matters pertaining to safety.
6. To stimulate curiosity in introducing a new subject or give background.
7. To show current rules, regulations, and school government.
8. To serve as a cumulating activity for students.
9. To motivate students to action and influence behavior.
10. To act as a salesman for student-sponsored money-raising devices.

Purposes of the Classroom Bulletin Board

1. Used as an instructional device.
2. Display current topics in subject area (inventions, trends, etc.).
3. For student and class records, progress, and attainments.
4. For student use as in presenting reports.
5. Making three dimensional by adding table in front of board.
6. Making three dimensional by using paper sculpture.
7. For students' contributions or a "growing" board.
8. For student planning, organization, and execution.
9. May be used for "seasonal" changes; or national holidays.
10. Used for guidance or character development; courtesy, patriotism.
Factors of Effective Bulletin Boards

1. Should show simplicity and clarity in arrangement.
2. Involve the reader so content is taken personally.
3. Pose a question which invites further investigation.
4. Get motivation by making startling statements.
5. Stimulate interest and hold through the entire text.
6. Change the board frequently; keep to a schedule.
7. Defer a planned schedule in favor of current topics.
8. Present one story at a time, or make "fences" between subjects.
9. Study display methods used commercially and apply to board layout.
10. Try to get third-dimension by objects, specimens, paper sculpture.

CHALKBOARDS

Historical Background on Chalkboards

Nocka (35) believes that rough boards were smoothed, then painted or stained black and written upon with white chalk; thus, the name "blackboard" was initiated. This probably took place in the early part of the thirteenth century.

About 1780, individual slate boards were introduced into the American colonies. These individual boards were almost identical in form and size to the early Roman tablets except they were made of slate. Between 1850 and 1865, large sheets of slate were fastened to the walls of the classroom. Slate continued to be used in schools until the turn of the present century and it is still available, being considered the best medium obtainable. Before 1850, the blackboards
were either the simple wooden type described above or plaster castings containing lamp black.

Genuine slate boards are more expensive than any type of chalkboard now being marketed. A special board being manufactured is called the "slated" board upon which the processing has been done to approximate as nearly as possible the original slate boards.

Color and the Chalkboard

Several years ago experiments were carried out at the University of Minnesota. Among other things, it was found that the notion that lighter chalkboards were easier on the eyes was without foundation. Dr. Tinker, of that university, maintains that brightness contrast is more important than color contrast.

Kahler (27, p.48) has listed criteria for evaluation of the qualities of the chalkboard based on the four following points:

"1. The combinations of chalk and writing surface should provide high contrast ... white chalk and boards with about 10% light.

2. More attention should be given to providing higher foot-candles on chalkboards.

3. The inherent lower visibility for the seats at the rear of the room should be kept in mind.

4. Both green and black boards can have about the same reflectance, but green seems to be a more cheerful color when selected to harmonize with room decorating colors."

What are the values in the use of colored chalk? The progressive teacher will not overlook the potential devices which can help get points over to the class with much more clarity and simplicity. The
following criteria will be found most useful in such an appraisal:

Evaluating Colored Chalk

1. May be used to promote classroom environment by use of colors.
2. Seasonal greetings and scenes bring about good group attitudes.
3. May be used for emphasis or key words in writing.
4. Shows inter-relationships between working parts. (Technical)
5. Showing relations in biology, zoology, etc.
6. Certain colors "advance" toward the learner. (Example: yellows).
7. Certain colors "recede" from the learner. (Example: blue).
8. To show processes or progression factors, organization, and relationships.
9. Illustrating one color over another. (Example: graph work).
10. Art techniques, applications and uses.
11. Special notices, fire drill directions, air raid instructions.

Evalulative Factors for Chalk

1. Is the writing quality good?
   a. Does it make firm, clean lines?
   b. Is the writing made freely and easily?
   c. Is the material free from hard spots?

2. Is the legibility factor good?
   a. Is good contrast obtainable with the particular brand?
   b. Does it have good pure white uniformity?
   c. Is it one of the approved yellow sightsaving types?

3. What are the durability and wear factors?
   a. Is the breaking strength at least $6\frac{1}{2}$ to 7 pounds?
   b. Is the chalk extruded or molded?
   c. Is the chalk rated at least 95% pure chalk?
4. Erasing qualities considered?
   a. Will a standard eraser remove the chalk evenly?
   b. Does the board get an even chalking in process?
   c. Does one color remain in streaks or marks?

5. Is the size considered for the use?
   a. Is it standard for general use?
   b. Is it too long and hence broken often?
   c. Can the oversize or jumbo sticks be utilized?

Evaluation of Effective Chalkboard Use

The chalkboard seems to be one of the oldest actual pieces of equipment (excluding the book) of all the visual devices now used in teaching. The strict evaluation of the chalkboard use is in direct ratio to the instructor's ability, training, and conception of the techniques employed.

Evaluation for effectiveness of chalkboard use depends upon whether or not the teacher understands and can use the following factors listed:

1. Know the process of analyzation of teaching for board use.
2. Be able to determine what should be put on the board.
3. Understand the physical possibilities and limitations of the board.
4. Be able to correctly plan a board presentation.
5. Know the various methods of putting writing on the board.
6. Know the various methods of putting drawings on the board.
7. Have or be able to use the various mechanical tools of the board.
8. Understand (if necessary) perspective, oblique, and isometric drawings.
9. Have mechanical aids for drawing vertical, horizontal and angle lines.
10. Understand how to get student motivation and participation with the board.

TEXTBOOKS

Background on the Textbook

John Amos Comenius (1592-1670), the Moravian Bishop, was probably the first to seriously consider the writing of textbooks purely from a functional viewpoint. He maintained that pictures were the true representation of things which could not actually be seen or touched by the student.

Noah Webster, the famous American lexicographer (1758-1843), wrote the first text used in the United States. It appeared in 1782, had 119 pages, and over a million copies were sold in the first year.

Over fifty years later, William Holmes McGuffy (1800-1873), then a professor, compiled his "First Reader" for a firm of publishers in Cincinnati. For the year 1836, that initiated something very daring and enormously different from the "spellers" which followed Webster's, and the religious tracts and primers which had been the basic fare for the previous half century.

McGinley (32, p.21) tells us that "McGuffy gave the children three ambitious gifts; reading materials planned for the age level of the child, selections of real literary worth, and moral teaching wrapped in an acceptable package".
Freeman (20, p.77) states that, "The illustrated text is the most convenient and the easiest type of material to use and its effectiveness is not greatly inferior to the other types of material. It is particularly useful as a means of rapid and wide distribution of new subject matter, especially among schools which are taught by teachers of limited training".

Textbooks are getting larger as time goes on. The greatest contributing factor was the attention and study given by educators to establish criteria for good textbooks. This stems from a national wave which swept the nation in the 1920's and 1930's in an effort to improve the education of the nation's youth. Many science texts have increased from 200 to 600 or more pages.

Oddly enough, much of this increased size has come about by the inclusion of numerous teaching aids designed to assist the teacher in his educative role; hence, it is understandable that authors and publishers alike, in a desire to meet competition on textbook rating cards, as well as to assist the teacher, have multiplied the types and numbers of these teaching aids.

Selecting and Evaluating Textbooks

Many methods of selection are used over the nation. In some states, committees are set up with scorecards and they select the basic texts for the entire state. The unfortunate part of this lies in the fact that the teacher must use that particular text whether he
wishes to or not. Chicago has had a plan where four like books have been placed on the "adopted" or approved list.

The final analysis of the specific course of study for which the text will be used is the source of standards. Therefore, it is necessary that the text be evaluated on the spot where it will be used. The criteria related to method of presentation may be derived from literature, but in light of the flexibility and needs of the individual instructor (providing he has a choice in selection) the standards may be formulated on the basis of research findings in some cases; in others, from consensus of educational authority and the judgment of experts.

If we acknowledge that the textbook is a teaching tool, and as such is merely an auxiliary or supplementary aid to the course of study, then the selection must also be based upon the content of the latter.

There are score sheets made such as Burr's (9, p.138) where he advocates using a scale of 1,000 points. These points are distributed among eight major divisions which are: Authorship 150, General Consideration 125, Mechanical Features 100, Selection of Subject Matter 150, Organization and Presentation 125, Techniques of Features 100, Proper Documentation 100, Teaching Helps 150. Included in this listing under the eight main headings are sixty-seven sub-heads which are to be checked.

Fowlkes (19, pp.10-13) set up criteria in 1923 for evaluating textbooks. The main divisions were based on the following:
1. The Author's Background, 2. Content, 3. Mechanical Makeup, and 4. Adaptability. Under these headings, Fowlkes lists sub-heads giving some indication of the weights assigned the various aspects of the text.

Weaver and Bollinger (44, pp.23-28), in their discussion of the values of textbooks, have devoted five pages to setting up certain points for consideration. They discuss the function of the text, its advantages to the teacher and the school system, as well as the disadvantages of using a textbook. The authors then go into the selection of textbooks based on (1) Publication, (2) Mechanical Construction, (3) Content, (4) Illustrations, (5) Aids in Using the Text, (6) References, and (7) Use of the Book.

At Oregon State College, Associate Professor Stanley Williamson, Head of the Department of Science Education, uses a mimeographed form (45) which is entitled "Check-list of Questions for Consideration in the Selection of a Textbook in ________". Williamson has his students make the actual observation and use the sheets prior to their entrance into the teaching field. The check-list is in the form of questions and is divided into four main heads, each with a numerical value. In order, they are: Author and Publisher 120, Physical Make-up 130, Organization and Subject Matter 185, and Teaching Aids 140, thus making a total of 570 points. The instructions read, "Any book that scores less than 480 points should not be considered for a textbook".
Evaluative Criteria for Textbooks

Check General Physical Characteristics.
1. Is the title explanatory, appropriate, vague, or misleading?
2. Is the binding cloth or leather for durability?
3. What is the total number of pages?
4. Does the text look thick and heavy or bulky?
5. Is the book oversize or clumsy to be inconvenient or antagonizing?
6. Is the thickness of the book appropriate for the grade level?
7. Is the text a standard size? (Six by eight inches)
8. Has book paper (uncoated) been used, making unnecessary thickness?
9. If thin stock (paper) has been used, is price still within range?
10. Is paper a good grade of dull finish to minimize eye strain?
11. Are there pages of solid gray to make reading uninteresting?

Check the Content.
1. The index:
   a. Determine the coverage of the book.
   b. Check passages referred to from the index.
   c. How often are certain concepts related?
   d. Where are certain concepts handled in the text?
   e. Determine frequency of student use for reviewing material.
   f. Determine frequency of student use for tying together topics.
   g. Check synonymous entries and cross references.
   h. Check integration of index for student comprehension.
   i. Be certain index is not an alphabetized table of contents.
   j. See that it is not a listed section of titles or sub-heads.

2. The Table of Contents.
   a. Does the table give the reader a bird's eye view?
   b. Is the subject covered adequately for the level?
   c. Can specific topics be quickly located from the table?
   d. Are relationships, concepts, and applications listed?
   e. Can sections be utilized in your own thinking order?

3. The References.
   a. Are they listed at the end of each chapter?
   b. Are all references sufficiently specific?
   c. Have they been carefully selected for applicability?
4. **The Bibliography.**
   a. Is there evidence that the author knows and has read the books listed?
   b. Are they adequate to motivate further student research?
   c. Are they broken down by subject-matter reference?
   d. Are specific pages or chapters added to standard information?
   e. Is reference given relevant to the topic and a brief comment?

5. **The Body Content.**
   a. What is the copyright date?
   b. Is it clear and simple?
   c. Is it written progressively; simple to complex?
   d. Are steps or explanations missing?
   e. Are vivid and forceful words employed?
   f. Is the subject presented with ordered logic?
   g. Is the material organized?
   h. Is the comprehension on the students' level? Check for missing definitions, ambiguities, sequesters, and other obstacles.
   i. Are anecdotes and obiter dicta included?
   j. Is there a special glossary of terminology?
   k. Are headings, sub-heads, sections, and topical outlines properly subordinated?

6. **General Illustrative Material.**
   a. Is it sufficient enough to give greater comprehension?
   b. Has careful selection been made to support the text?
   c. Do they function to break monotony of solid pages of type?
   d. Are there a sufficient number of charts, diagrams, and graphs?
   e. Is "freshness" evidenced, or does the edition need revision?
   f. Are the illustrations modern (but not moderne)?

Check **Authorship Collaboration.**
1. Has the scope of the treatment been enlarged?
2. Have other points of view been brought into the picture?
3. Has the difficulty level of the text been modified?
4. Have curriculum needs or regional practices been modified?
5. Has a single author's demonstrable limitations been removed?
6. Have differences rather than similarities been the result?
Check Single Authorship.

1. Does the text represent the viewpoint of one individual?
2. Is the author a recognized leader in his own field?
3. Is the viewpoint in accord with present educational aims?
4. Has the author revised his text often enough?

PROJECTED MATERIALS

In 1918, Hockman (25, p.127) predicted, "Vast sums are to be spent in making films which will supplement textbooks in the American schools. The film is geared into the verbal processes. It will illustrate, and motivate, and "provoke" pupils to find out more about the subject by the slower and less effective word-heavy processes.

By checking the latest (1951) H. W. Wilson Educational Film Guide (16) for the motion pictures available for the classroom, one finds a listing of 8,251 teaching films, and these do not include many of the "free" types of films available from some of the manufacturers and industrial firms.

Supplementary tools to be used must have factors which will work for and with the instructor. Mark A. May, Director of the Institute of Human Relations at Yale University in New Haven, Connecticut, has listed the various functions which can be expected for a proper classification of these vital teaching aids. It is given here as May originally conceived the plan (34, pp.339-340), but with certain deletions to conserve space.

"I. The Motivational Factor. The Motivational film should be used to arouse interest, to initiate activity, to create a desire to disturb the complacency and indifference of the learner . . .
II. The Informative Function. While this conception has been greatly modified in recent times and replaced with the notion of enriching experience or 'reconstruction of experience' or that of acquiring wisdom along with knowledge, yet the informative function remains one of the main tasks of teaching...

III. The Demonstrative Function. The teaching methods best suited to the development of skills are coaching and demonstration... The value of a demonstration is that which sets a model to be imitated... the type of demonstration depends upon the nature of the skill...

IV. The Appreciative Functions... it is assumed that it will appear in each of the above type of films. There are, however, certain areas in the school curriculum in which the teaching problem is mainly that of cultivating taste and appreciation."

While May has set up the above functions of teaching films, it remains the duty of the individual teacher to do the proper evaluation of each teaching aid for the specific objective.

The Silent Film

A sad condition exists where the instructor has to make a running commentary with a silent film. This procedure makes it necessary that the teacher be extremely familiar with the subject, well acquainted with the sequence, and to a certain degree a good extemporaneous speaker. Reading of any type of script under these circumstances is extremely difficult. It should be kept in mind that silent film may be projected with any sound machine; however, the reverse is not true for sound film may not be run on a silent projector or the sprockets will tear holes through the sound track.
The Sound Film

The advantage of sound film with its well-known sound track making possible the added oral accompaniment should need no promotion. The synchronization of voice, music, and other sound effects has added its weight in realizing educational objectives. In evaluation, the prospective purchaser should realize the machine to handle sound film is somewhat costly, a bit heavier and larger, and to some slight degree more difficult to operate.

The Color Film

As manufacturing methods and scientific problems in photography continue to be solved, the use of color in film will become more and more common. Many of the films listed in the catalogs for educators are now available in either black and white or color; the difference being double the cost. The average educational film today (1952) costs approximately $50 in black and white and the color runs $100.

The use of color in films should be made in some cases. It would be desirable to obtain maximum effectiveness of types of film and teaching aids which utilize color in identification. Some would be identification of snakes, flags, protective colorations in nature, art applications, the works of great masters, specialized flora and fauna of various parts of the world, costumes and history of dress, and many other applications. It is safe to say there will be more color film available and it will continue to be used (whether the teachers realize its contributive values or not).
The Feature Film

No report would be complete without some consideration being given the feature film. This concerns the feature film from the commercially-produced films for entertainment purposes and those which are edited for certain applications to education. In this field are the classics which are under the jurisdiction of the Teaching Film Custodians and include such masterpieces as: "A Tree Grows in Brooklyn", "Mutiny on the Bounty", "Due Process of Law Denied", and many others.

It is emphatically stated, and fortunately shared by many leaders in the field, that the feature film has absolutely no place in the school if projected for an entertainment value only. The exception would be showing after school hours. Further, there is no justification whatever in grouping classes for the viewing of films or making an auditorium situation of the presentations. In all cases (wherever possible) the film should be shown in the classroom as part of the lesson unit.

Factors Involving Evaluation of Full Length Feature Films

1. Feature films are now being used in the schools.
   a. They are at present being educationally utilized.
   b. Features are being used in the interest of entertainment only.

2. Feature films can develop discrimination of student's selection.
   a. The student can be taught what to look for in good pictures.
   b. Students can evaluate and help select feature films.
   c. Individuals can be easily checked on what selections they made.
3. Attitudes can be established and uncovered in many feature films.
   a. These can be pointed up in classroom-prepared feature films more easily.
   b. Individual self respect, social concern, and cooperation can be had.
   c. Thinking, research and creativeness can be presented.

4. Group faculty planning must take place in using these techniques.
   a. Preview by the staff for proper preparation is necessary.
   b. Presentation problems (in school) and time schedules worked out.

5. Usable content of feature films considered.
   a. No one film will contain all attitude combinations.
   b. Some features will contain mainly factual material.
   c. Facts are only important to the extent of contribution to teaching.
   d. The material must be delimited to obtain only wanted applications.

   In order to realize the full possibilities of the use of feature films, the experience must be first had by the teacher. One device which has been recently developed to aid the teacher obtain this experience and point up the critical points of the feature films is the so-called "Discussionstrip".

Documentary Films

One of the most important types of films available to the educator is the documentary film. It is to be regretted there are not more of these types of films available. Ramseyer (37) investigated the effect of the documentary film on social attitudes. Using students from the sixth grade through college and non-college adults, he definitely showed that attitudes could be changed by using the motion pictures.

Lake (29, pp.113-114) maintains motion pictures should be previewed by the teacher before they are used in any learning unit, and that film ideas should be adjusted to the purpose of the lesson.
There should be specific class preparation done to receive the film. Before and after the showing there should be time allowed for related class activities. There should be a definite "check-up" of the ideas which the students obtain from the film.

Dickter (15, p.193) listed errors, or "don'ts" for teachers who use films. The eight points below are from his list.

1. Showing two or more unrelated films during the same period.
2. Failing to have pupils know specifically the purpose of the film.
3. Asking very general questions to start the discussion after film showing.
4. Showing the film at the wrong time.
5. Failing to use the film a sufficient number of times.
6. Reading extensively to the pupils from the teacher's manual which accompanies the film.
7. Using films not sufficiently related to the unit under study.
8. Using a film when some other aid would have served better.

MICROPROJECTION

There are several very specialized audio-visual aids which belong in a field by themselves. Their use is limited to certain applications and subject matter. Briefly the microprojector enables a group to see projected on a screen what would otherwise be seen by one person looking through a microscope.

The fields which are most suitable for the use of this machine are the sciences, biology, physiology, chemistry, health, physics, and others of that category. Kinder (28, p.340) in reporting upon the use of microscopic projection in using live specimens by Wimmer states,
"Science teachers have achieved excellent results with the microscopic projection and microphotographic slide. For purposes of bringing interest and reality to the class, these media can scarcely be equaled".

Dale (13, p.249) cites the values found by Dr. G. F. Cahoon, who found the following to be satisfactory types of microprojection:

"(1) any of the usual slides in biology, physiology, and other sciences, (2) crystals of chemical compounds, (3) the circulation in the foot of a frog, (4) the structure of various fibers, for comparing cotton, wool, silk, and the like, (5) the living plant and animal tissue".

EVALUATIVE CRITERIA FOR MICROSCOPIC TECHNIQUES

1. The machines and equipment.
   a. Is there a microprojector available in the school?
   b. Is there one available in the school system?
   c. Is there a machine upon which an attachment will fit?
   d. Is there a slide or opaque projector available?
   e. Will other teachers use the machine if purchased?
   f. How often would the machine be in actual use if purchased?
   g. Will the school budget stand the cost of a good machine?

   a. Will they be student-made, teacher-made, or commercial?
   b. Can they be made well enough for microscopic use?
   c. Can 2 x 2 or 3 1/4 x 4 inch slides be used as effectively?
   d. Are there flat pictures available for the unit?
   e. Will the school budget furnish commercial slides?

3. Miscellaneous factors.
   a. Will the student be expected to do any tracing?
   b. Can the room be adequately darkened?
   c. Is there a suitable screen available?
   d. Have commercial slides been previewed?
   e. Have commercial machines been demonstrated?
1. The student.
   a. Is level advanced enough to warrant this technique?
   b. Is the objective group understanding or individual research?
   c. Would it be necessary to have individual microscopes?
   d. Is the time factor a necessary element to consider?
   e. Could concepts, understanding and relations be more quickly shown in the area and on the level?

THE FILMSTRIP IN AUDIO-VISUAL

The filmstrip is basically the same as 35mm motion pictures as far as physical characteristics are concerned; however, the applications is entirely different.

The silent filmstrip has printed captions incorporated into its makeup upon which the instructor can focus attention and bring about clearer comprehension. The time spent on the caption is not limited and added information, explanations, or other clarification may be employed as long as desired. It is this procedure which allows each image to be analyzed, points to be brought out, and student discussion participation in a semi-darkened room.

Another feature of the filmstrip is the sequence of the frames. This may be a distinct advantage in some cases and a disadvantage in others. Sometimes the very simplicity of the arrangement has merit. This occurs when each frame contributes to the lesson content in such a manner that there is no possibility of leaving out important points.

The sound filmstrip, although not actually having sound as the term is commonly employed, requires a more detailed process of using. The sound part is supplied from source other than the filmstrip, usually a transcription on a disc or plastic tape. Where the disc is used in conjunction with the filmstrip, a special machine is supplied
which projects the picture, and the turntable is synchronized so that the recording fits the images as they are projected onto the screen.

The disadvantage of this latter type can easily be seen in that the entire pace of the presentation is set by the sound medium. There is no possibility of holding a frame for prolonged study or going back several frames for purposes of review and other desirable ways of use already mentioned.

There are other advantages and some disadvantages in the use of both types of filmstrips. The final discussion, of course, lies with the amount of use and the kind of use which best fits the situation. The recommendation here indicates the superiority of the silent filmstrip over the sound types, and if sound were desirable at any time it could be supplied over other equipment available in most schools.

The Silent versus Sound Filmstrip

1. Consideration of the silent filmstrip:
   a. Instructor must be able to supply commentary.
   b. Commentary if read requires script writing.
   c. Instructor must be familiar with sequence.
   d. Reading commentary requires sources of light.
   e. Student discussion is possible with silent type.
   f. Silent types may have own captions.
   g. A teacher-made tape or record can be made to fit.

2. Consideration of the sound filmstrip:
   a. Part of the load is lifted from the teacher.
   b. Less preparation time is required of the teacher.
   c. All material is given exactly the same each time.
   d. Sound effects add realism to presentation.
**Evaluation of the Filmstrip**

1. Use of the filmstrip in presentation:
   a. Presents material visually by projection.
   b. Students may enter auditory discussion.

2. Promotes greater student interest:
   a. A more personal experience.
   b. Motivates activity participation (wider response area).

3. Excellent aid to good English usage:
   a. Incites vocabulary building.
   b. Brings about word clarifications.
   c. Learner reads silently, teacher aloud.
   d. Hears and learns correct pronunciations.
   e. Identifies words with images or objects.
   f. Promotes student reading and research.

4. Shows abstract relationships:
   a. Concepts are clarified and explained.
   b. Gives clarifications of attitudes.
   c. Relationships are clearly defined.

5. Rate of presentation speed adjusted to learners:
   a. Much or little time may be spent on each frame.
   b. Strip may be turned back for review or checking.
   c. Frames may be skipped rapidly if inappropriate.
   d. Group thinking can be directed and controlled.

6. Readiness of use:
   a. Many filmstrips may be obtained free.
   b. An inexpensive material (usually from $2 to $4).
   c. Many strips can be replaced for 25 and 50 cents.
   d. Projector relatively inexpensive (silent).
   e. Strips should be considered expendable.

7. Ease of projector operation:
   a. Little or almost no training required.
   b. Students may operate efficiently (participation).
   c. Students may use the strip to make own reports.

8. Evaluating the content:
   a. Does the strip do the job effectively?
   b. Does it present an introduction to a subject?
   c. Will the strip give a background?
   d. Can a skill or manipulation be taught with it?
   e. What are the results of student-teacher evaluation?
The following points are some which are often overlooked by the inexperienced teacher. They are given here as a guide in selection before purchasing materials and handling equipment for maximum efficiency.

Criteria for Purchasing Filmstrip Materials

1. Do not buy a whole "kit" of filmstrips.
2. Beware high pressure tactics in buying filmstrips.
3. Keep own and students' fingers off surfaces of films.
4. Compare projectors side by side when purchasing.
5. Measure light on screen with different projectors.
6. Measure heat in aperture with slide thermometer.
7. Filmstrip cannot be spliced without losing one frame.
8. Most filmstrip is damaged at the beginning of strip.
9. New leaders can be spliced onto filmstrips easily.
10. Secondary and college subjects are making appearance.

LANTERN SLIDES

Slides are probably the most effective of all the visual aids and also probably the least used to good advantage. There is no limitation to the possibilities of the variety which can be made by the teacher or obtained from the distributors. Reed (39, p.1) states in regard to teacher-made slides, "... the results obtained from lantern slides will be in direct ratio to the effort put into the slide when one is preparing, planning, and making the slide".
Advantages of Slides Over Other A/V Aids

1. Storage requires small space in comparison with charts, etc.
2. Sequence of showing can be made much more flexible.
3. Extraneous material can be eliminated.
4. Small detail can be singled out and projected.
5. Slides available where other aids are nonexistent.
6. Slides can displace tedious blackboard diagramming.
7. Slides show less wear than charts, maps, etc.
8. Usually more economical in materials to make a slide.
9. Can be made by photographic means by any teacher.
10. Students can make and display their own creations.
11. Certain slides can be rented or borrowed.
12. Slides are not easily broken or damaged.
13. Can always be available for quick and easy reference.
14. May be projected in a room not totally darkened.
15. Images remain steady on the screen.
16. Maximum brilliancy of image can be obtained.
17. Slides can be superimposed on overhead machines.
18. Slide projectors are easily operated.
19. Processes or changes are easily illustrated.
20. Time factor and schedule of showing is no handicap.

The criteria presented in the twenty points above should be carefully checked before deciding upon which type of teaching aid will best suit a particular need.
Functions of Slides in Teaching

Slides may be used in the following manner:

1. As a preview of the lesson to be presented.
2. To give a background on a new subject.
3. To introduce a subject to a new class.
4. At close of lesson as a review of ground covered.
5. To supplement lesson in progress.
6. Used to promote group discussion on lesson content.

While great flexibility is one of the chief advantages of the use of the lantern slide, there are certain cautions which must be observed. The most grievous errors in the use of slides may be summed in the following:

1. Avoid showing too many slides at one time.
2. Do not show unnecessary or irrelevant slides.
3. Do not fail to have a planned sequence in the showing.
4. Avoid placing fingers on the face of the slides.
5. Do not use slides that have dirty surfaces.
6. Do not use slides that have broken cover glasses.
7. Do not forget to wipe off the dust occasionally.
8. Do not hog the show; let the slide tell its story.

When the instructor is directly involved in the preparation and the following use of these, there is a greater satisfaction than found in most other aids. The teacher has a direct interest because of the personal element which must be included in the production. These factors which, when set down, become a personalized inherent satisfaction
which is essential to both successful teaching and living.

Personalized Values of Using Slides

1. Preparation induces and promotes:
   a. Original thought and applications.
   b. Self expression and creation.
   c. Further research and educational growth.
   d. Personal participation and self-projection.
   e. Accuracy of detail and higher standards.
   f. Artistic arrangement and concepts.

2. Projection of the medium includes:
   a. Pride of accomplishment and proficiency.
   b. Sharing of experiences and ideas.
   c. Dramatization and showmanship.
   d. Maximum attention of students.
   e. Satisfaction of achievement.

3. Provides opportunities for students to:
   a. Give criticism, constructive and otherwise.
   b. Have special interests in presentations.
   c. Correct erroneous impressions and omissions.
   d. Share similar known experiences and applications.

THE STEREOSCOPE

Sir Charles Wheatstone, an English physicist and inventor, in 1838 presented a paper on the physiology of vision to the British Association at Newcastle and exhibited an instrument which he called a stereoscope.

With this instrument, Wheatstone was able to unite two dissimilar pictures taken from two slightly different angles of the same object and thus show three dimensions. After Wheatstone had presented his paper and exhibit, Elliott, a mathematician from Edinburgh, disputed Wheatstone’s claim to being the first to have discovered stereoscopic
vision and claimed that he invented an instrument prior to this time. As proof, Elliott referred to a paper he had written in 1823 to a class in logic at the University of Edinburgh, entitled "On the Means by Which We Obtain Our Knowledge of Distances by the Eyes". Elliott's stereoscope was without lenses and depended upon the adjustment of the eyes to draw two pictures together.

About this time, Sir David Brewster entered the controversy. Being a physicist in his own right, he demonstrated the correctness of his theory by inventing the first stereoscope with lenses such as we know the instrument today.

In America, in 1859, Oliver Wendell Holmes wrote an article published in the Atlantic Monthly on stereoscopic photography. He referred to the instrument as a "squinting magnifier" because, as he explained, two pictures can be brought together by squinting the eyes without the instrument.

PRESENT APPLICATIONS

Flat pictures are often misleading unless the student understands how form is represented by shading and tone. Models are more realistic than flat pictures, but accurate models are expensive and many times are not available. Even the best models leave much to be desired in presenting living material, machine operations, and movement of all types. Heiss, Osborn and Hoffman (23, p.161) maintain that "Flat pictures have but two dimensions. They lack depth, which sometimes gives the pupil wrong initial concepts".

Hoban (24, p.149) writes of the instrument, "So valuable is the
stereograph that it is difficult to understand why it has not been widely used — why so many stereographs repose in some school closet or storeroom”.

The realization must be constantly borne in mind that to derive the full benefit of an individual viewer, no matter which is used, it is necessary to have each student spend as much time with each view or item being studied as he wishes. The student cannot be hurried or distracted by others waiting to get their hands on the aid. It could be likened to a boy doing a unit on bird study. As soon as he found his subject (the bird) and began a close scrutiny for study purposes, he is forced to hand over the pair of binoculars, which incidentally also falls into the classification of individual viewers.

An added factor in the use of these viewers, and one which shows up in the evaluation chart, is the therapeutic value involved where both eyes of the student are forced to work together as is found in the two lens microscopes.

Evaluative Criteria for Stereographs and Stereoscopes

1. Are there enough instruments to take care of the needs?
2. Is material available in the field of instruction?
3. Can the teacher make materials for the instrument?
4. Are there defective vision children to consider?
5. Is there adequate time for individual mastery of points?
6. Are there teacher-prepared questions for motivation?
7. Can the tool be used for preview or a review?
8. Is the stereograph easily available to the students?
9. Will the aid be used in the library, classroom, etc?
10. Are there other materials to tie-in the medium?

The above criteria will apply to all types of three-dimensional teaching aids including the telebinocular, polaroid glasses (to fit the individual student), the standard, the two lens microscopes, and various types of peep boxes.

EYE TRAINING AIDS - BACKGROUND

Wilbur A. Yauch, in his recent article (49) in the Reader's Digest, tells us, "Reading represents the pinnacle of man's achievement. Despite television, radio and pictures, it is still the most important method of broadening our horizon. Yet to millions of adults reading is a painful, tedious process — because they were taught to read by monotonous, now-discredited drills". Admittedly this is one skill which must be taught in the schools. While some feel we are doing a better job than in the past, it still remains that there are twenty to thirty per cent of our children who are seriously handicapped, and many others are not reading to capacity.

There are three factors to consider in this problem: (1) The teaching of correct reading habits, (2) Finding the bad habits or diagnosis of the reading abilities, and (3) Correcting the existing reading habits of our students. Of interest here is the equipment and material which have been developed in the way of visual aids.

Over two thousand years ago the Greek mathematician, Euclid, knew that each of the human eyes has a different point of view and therefore they see objects differently. Euclid described this phenomenon in
his treatise on optics.

Five hundred years later, Galen, the Greek physician to one of the Roman Emperors, treated the subject of binocular vision more fully than did Euclid and wrote a book entitled, "On the Use of the Different Parts of the Human Body".

When L. E. Javal, a French physiologist, observed in 1879 that a person's eyes move in a series of jumps along a line of print in the reading process, he started a trend of thinking in a different channel than had been previously explored.

THE OPHTHALMOGRAPH

From 1902 and for the next thirty years many eye-movement cameras were constructed to study the movement of the eyes in reading. This progressive movement is ably recorded in a book, "Controlled Reading", written by Earl A. Taylor. The book is profuse with many illustrations showing the development of the present ophthalmograph machine. The machine in principle is relatively simple and the operation by the untrained teacher can be done with as little effort as setting up a projection screen in the classroom. This picture of the eye movement is in the form of a graph on the film and the following information is furnished:

1. Regressions or the backward movement of the eye when going to the left to read on the same line.

2. Fixation or the eye pauses when the eye rests on one word or group of words.

3. Return sweep or the return of the eye to the left to start reading the next line of print.
4. Duration of the fixation or the amount of time it requires to comprehend a word.

5. Span of recognition or the amount of print (number of words) grasped or comprehended in one movement.

6. Reading rate of the student can be determined because of the rate of speed the film moves in the chamber.

THE MODERN CONCEPT OF SEEING

In the last eight years the concept of how the human eye works is gradually being changed. A leader in this movement is Dr. Samuel Renshaw, a professor at Ohio State University. Dr. Renshaw no longer believes that the eye is something like a camera, in that when the image hits the retina in the back of the eyeball it results in an image or conception in the brain.

According to this theory then, the quickest and best way to recognize things is to look at them as wholes or as one swift coordinated action. In 1942, Renshaw developed the tachistoscope for such jobs as airplane recognition for the armed forces.

THE TACHISTOSCOPE

In 1895, Catherine Aiken (1) wrote a book entitled "Methods of Mind-Training". She developed the theory of short exposures of various types of materials for development of mind-training. The student was first allowed to observe and then questioned on what he saw. Aiken was primarily concerned with habits of quick perception, the ability to discriminate quickly and the accuracy of the perception.

The tachistoscope is a standard lantern slide or filmstrip
projector equipped with a shutter similar to those found in cameras. These machines are of two types. Both utilize direct method projection but in one the image is projected up and forward to the screen using the newer "overhead projection", while the old method of straight forward projection is employed in the other machine.

Dr. Fred Winger (46, p.6), Assistant Professor of Secretarial Science at Oregon State College, after experimenting with the tachistoscope in typing classes, reports that "the use of the darkened room in tachistoscope training is conducive to relaxed stroking and lessened general tension on the part of the student".

There are other types of materials or aids which will contribute toward the same end as the tachistoscope. In 1943, the air force published a manual describing in detail the construction of a very simple machine which they called the "Wooden Flash Shutter". While the machine is very elementary in design, certainly the school with a limited budget could well afford to give it some serious consideration.

THE TELEBINOCULAR

The telebinocular is a machine made on principles similar to the old-fashioned stereoscope. The use of this machine gives a very exhaustive check on the child's eyes. It screens out the nearsighted, farsighted, astigmatism, vertical imbalance, lateral imbalance (lack of the muscular balance of the eyes), far-point fusion, binocular visual efficiency, near-point fusion, and stereopsis level.

Blair (7, p.53) states, "This test (with the telebinocular) is not only more comprehensive than most vision tests but has the
distinction of being the first one devised to appraise the coordination of the eyes under conditions similar to those involved in reading".

The advantages of using the telebinocular are:

1. Each eye is tested independently while both eyes are functioning as usual. In the process, small test objects are omitted from one side of the picture being viewed.

2. Binocular vision is appraised accurately and can be interpreted.

3. Visual efficiency of both eyes as well as the activity of each single eye can be accurately tested.

THE READING ACCELERATOR

This machine is also known as a reading board and as a reading pacer. Fundamentally, it is a mechanical device which by various methods forces the student to read faster by covering lines of print at a predetermined pace. Any book, magazine or other material may be used. In some machines an aluminum plate moves down the page causing the pupil to keep ahead of it. The speed can be varied from 100 to 600 words a minute.

Blair (7) is of the opinion that, of all the machines on the market today for increasing reading speed, the reading accelerator appears to be the most useful.

The reading accelerator manufactured by the Science Research Associates makes the following claims for their product in terms of usefulness:

1. Requires no special training to operate.

2. Can be used with any book without tearing pages.

3. Is portable and guaranteed mechanically.
4. The normal reading situation is duplicated.

THE METRONOSCOPE

This machine is essentially the same as the tachistoscope in its function, increasing the speed and comprehension of the reader. By use of three shutters showing one section of a line of type in a sequential manner, the reader is forced to keep ahead of the closing of the apertures. The main purpose of the machine is to develop rhythmic reading and does help children to rapidly recognize words, phrases, and short sentences. As may be seen, the use of shutters prevents regressions; in addition, the prepared material is composed with an attempt to make words or thought groups segregated. For younger children, the machine teaches them to use their eyes in a left-to-right movement.

OTHER AIDS FOR READING

Motion picture films are rather a recent addition to the problems encountered in reading. In one set prepared by the Church Film Company of Oakland a new approach has been achieved. The first sequence is a series of dots which flash across the screen at equal intervals, causing the eye to attempt fixation as it appears and moving on to the next. The speed of these dots across the screen is gradually increased. From that elementary process the second sequence is a short essay on reading. Harvard University also distributes a set of films entitled "Harvard Films for the Improvement of Reading". Although a number of secondary schools have been using these films with apparent success, the extent of the effectiveness has not as yet been determined.
BULK MATERIALS

In this classification are placed the various teaching instruments used in the classroom such as globes, models, dioramas, mockups, specimens, and objects.

Globes as Visual Aids in the Classroom

The globe should be regarded as the ideal teaching tool in all matters relating to our world. It is a scale model of our earth and is in three dimensions. Globes are an essential related teaching aid to be used in conjunction with the classroom map; in fact, Eldridge (17, p.103) explains, "Children will understand the full meaning of a map only if there is ample globe study". It should be understood that neither the flat map nor the projected image is as desirable in the field of world shape and relations as the globe because all other teaching devices are one step further removed from reality than is the globe.

The globe as a teaching tool well-designed and properly used can help teach relationships, space, time, distance, inter-continent transportation, inter-dependency, attitudes and tolerance. Primarily, globes are used in teaching a group or for reference by individuals. The following criteria will establish points for reference checking to determine value in selection.
Criteria for Classroom Globes

1. The classroom globe should not be less than sixteen inches in diameter.

2. The sixteen inch diameter globe has a scale of one inch to 500 miles.

3. Larger globes should be in direct ratio to the sixteen inch model.

4. The physical-political globe should have a movable meridian.

5. Globes should be supported by a high stand from the floor.

6. All classroom globes should be removable from the stand.

The six points above should be considered with the evaluative criteria as given with the section on maps, for the globe is merely a "rounded" map and all factors of printing, legibility, content, dates, and other such factors apply equally to it. The special types of globes should be carefully analyzed according to the processes set up in this paper or other such criteria before evaluation can be made with validity.

THE MODEL AS A TEACHING INSTRUMENT

Models have great flexibility in that they may be student-made, teacher-made, or commercially-made. In the student-made models, the greatest contribution to education is not what happens to the model or how it is used, but what happens to the student in the thinking manipulation and successful completion of the project.

Teacher-made models are designed to fill a specific need to get across an abstraction which is difficult to teach or show in any other manner. A complexity of action or a certain relationship is sometimes
desirably shown with models. Moving models can readily illustrate cause and effect. Gears turning and meshing with each other cause certain things to happen.

Civics, history, mathematics, English, all types of industrial arts courses, and the vocational arts courses can and should use models which range from the simple paper-made aids to elaborate electrically-wired or gear-driven devices.

All models are not three-dimensional; there are many types of two-dimensional models which are usually placed on flat surfaces as in wall exhibitions. The mere fact that materials required to make models are usually found around the school shop should motivate more teachers in their construction. These suitable materials are wood, metal, plastic, glue, plaster of paris, and combinations of these.

While by-passing evaluative factors such as size, operations involved, durability and storage, attention must be directed to evaluation from the audio-visual standpoint. The following factors will indicate the most important phases to be examined in determining the worth of the model as a teaching aid.

**Evaluation of Teaching Models**

1. Is it available for instant use, is transportation a factor?
2. Is it large enough to be viewed comprehensively by the entire class?
3. Are the component parts simple enough for the level of learning?
4. Can resemblance to the object be easily recognized?
5. Is it designed so that the student can touch, handle or operate?
6. Does the model have other practical possible applications?

7. Can a standard evaluation form be used in checking its value?

8. Will the model actually function? Has its use been tested?

9. Will the model sustain and maintain interest for the duration of the unit?

10. Will the aid in question provoke discussion and questions?

11. Can it be used to promote further research and reading?

12. Does the model adequately clarify the teaching objective?

13. Is the cost commensurate to the actual time of usage?

DIORAMAS

This important teaching device was used extensively prior to the advent of the motion picture and has special teaching advantages, especially among the lower grades. The medium enables the teacher to bring small sections of the world, either past or present, to his students for examination and closer study. If properly constructed, the student may arrange, handle, and "feel" the component parts of the setting.

In many cases the local museum has made available from their collections the smaller type dioramas. All teachers are urged to seriously analyze and make use of this valuable teaching tool.

**Evaluative Criteria for Dioramas**

1. Does it recreate the scene with authenticity?

2. Will the aid demonstrate progression factors or invite comparisons?
3. Are the relationships clearly defined within the aid?
4. Does the diorama allow use with related aids?
5. Can students participate by handling or operation?
6. Is the objective of the aid clearly illustrated?
7. Are specific points emphasized and clearly shown?
8. Can the student understand why knowledge of this aid will benefit him?
9. Has provision been made for adequate illumination within the case?
10. Has reality been achieved by rounded objects, color, painted background, etc.?

The above criteria will form a useful method of determining values in the use of dioramas whether selected from those already available or teacher-made projects.

THE MOCK-UP AS A TEACHING TOOL

The term mock-up comes from the word "mock" or literally a mock of the real thing. It is not necessary to have a full sized scale of the original or to include, as in anatomy, other organs of the body except where there is a relationship to the main teaching unit. Even where there is a relationship, it might be advisable to eliminate some of the material depending upon the learning level of the students.

The mock-up has a definite place in the educational scheme and is a most useful teaching aid. The one main criteria is this — unless the aid will help do a better job of teaching in a shorter time, there is no justification for the labor and expense involved in its creation.
Evaluating Mock-ups for Teaching

1. Does the aid contain hidden operations?
2. Does the unit show a complex or complicated process?
3. Were all unnecessary details eliminated for simplicity?
4. Does the use simplify action or mechanics?
5. Has emphasis been placed upon necessary key points?
6. Has the mock-up been reduced in size accurately?
7. Has the mock-up been enlarged sufficiently?
8. Do cut-away sections promote clarity of conception?
9. Does the change to a mock-up retain enough reality?
10. Is it possible to slow down or speed up action?

By the application of the above and other such analyzed factors can the mock-up be evaluated for its effectiveness as a teaching aid? The imagination of the teacher can go far into the possibilities of the use of the device, but the worth of it must be determined before tackling the job of construction.

UTILIZATION OF RADIO

Station KDKA in Pittsburg is credited with the first regular radio program in 1920. The California volume of the American Guide Series made up by researchers and writers on the Federal Writer's Project (3, p.117) tells us, "... KQW of San Jose was pioneering (radio) for the world, as well as for California, when it initiated in 1912 regular broadcasts for speech and music". At any rate, regular broadcasts of radio went on the air in 1923. The use of educational radio programs
started in 1931.

Because of the nature of the teaching aid, radio being an electronic device, it will be considered from its physical aspects before taking up the teaching factors involved.

In considering radio, the following divisions should be considered separately before adequate understanding can be attained to set up evaluative criteria:

1. Determining the most effective radio to purchase.
2. Knowing how to operate a radio for efficiency.
3. Understanding claims for radio by educators.
4. Determining validity of these claims for radio.
5. Knowing how to evaluate programs in the subject area.
6. Understanding the process of using available programs.
7. Knowing how to use radio techniques in simulated programs.

One of the main factors in the selection of the radio is that it should be able not only to function on the AM bands, but also to receive the FM broadcasting programs. Insofar as the majority of the educational stations can be operated on the FCC allocated channels, emphasis should be given this point; for, in the future, should radio become a more popular teaching tool, there will be more and more of the FM type of broadcasting done.

In considering the radio from the view of the purchaser, there are no criteria in looking at the exterior fittings, cabinet, or size. The number of tubes contained in the radio is no index to its working qualities or possibilities. A radio with less than five tubes should be avoided at all costs. The brand name on a radio is no criterion
for its purchase as a classroom teaching tool for reliability. The true test of any piece of equipment to be used as an audio aid is the actual performance under the working conditions with which it will be utilized.

CRITERIA FOR PURCHASING A CLASSROOM RADIO

For the average classroom where thirty to perhaps forty pupils are to listen, the following set of criteria should be considered:

1. Will the set function on both AM and FM bands?
2. Is the loudspeaker of the permanent magnetic type?
3. Is diameter of loudspeaker at least eight inches?
4. Can provision be made to use several loudspeakers?
5. Does the set have more than five tubes?
6. Is the set portable and equipped with a handle?
7. Is there a connection for an outside antenna?
8. Is there a connection to hook in a tape recorder?
9. Is the set equipped with a tone control?
10. Will the set operate on the current available?
11. Is the set designed for student operation?
12. Is there a good built-in antenna?
13. Is there a convenient ground connection?

Many times a set may be contemplated which does not have all the features given in the above table. Many of these may be obtained by minor changes which can easily be done by competent radio experts. These criteria are the desirable features which should be included in all sets designed for classroom use.
After making the tentative selection of a set to be used, the next step is the testing. Assuming the above criteria have been employed, the following procedures are outlined to aid in making the final selection.

PREPARATIONS FOR EVALUATING RADIOS

1. Bring all sets to the school room for trial.
2. The sets should not be in full view of the listeners.
3. Have children seated in the room for normal situation.
4. Have a committee of teachers or administrators present.
5. Judge the results by teacher and children reaction.

The following tests are listed here to enable teachers and others concerned to make valid decisions:

1. Tune all sets to the same station.
2. Check first for outside noise and interference.
3. If possible hook to an outside aerial.
4. If possible hook to a good ground connection.
5. Is there is a persistent hum, pull out electrical plug and reverse prongs.

Radio Performance Before a Jury

Preparation has been done and conditions are suitable to conduct a trial before the listeners. The points to be considered in this experiment are:

1. Tone quality. First turn up volume on set number 1. Turn down the volume and turn the volume up on set 2. Continue this procedure until the listening jury has selected the one most pleasing.
2. **Reception.** Tune all the sets to a distant station and compare the strength of the signal (broadcast). Make selection of the ability of the sets to receive the signals.

3. **Tone distortion.** Turn the volume up on each set above the range you feel is necessary and have the jury observe for possible "rattling" noise or tone distortion.

4. **Separation or selectivity.** Tune all sets to stations which are close together on the broadcasting bands. Will one set separate the stations more clearly than another?

5. **Local selectivity.** Tune all sets to all of the local stations. Will one set pick up all of them more easily than another?

6. **Drifting.** Tune all sets to one station and turn the volume down. Conduct your jury findings and leave sets in operation. Return and one at a time turn up volume and check all sets to find which has drifted off the station frequency and needs re-tuning.

7. **Costs.** Consider the cost in relation to the school budget. Take into consideration the amount of use the radio will be expected to have in the particular school.

8. **Dealer.** It is better to purchase from a local dealer who will stand behind his product, can make repairs, and will supply a machine while yours is being repaired or overhauled.

Crews (12, p.70) tells us, "... the ear is one of the easiest senses to deceive. It is perfectly willing in most cases to be deceived. There seems to be a certain sensory pleasure in this deception". And this seems to be true, for how often has one said, "I will believe it when I see it". In listening, we do not have to check any credulity; and this is certainly true in listening to the radio.

It is true that sound can handle very successfully a purely factual presentation as is testified by the success of radio in the field of news-casting. But in addition, sound has the additional power of emotional appeal.
FUNCTIONS OF EDUCATIONAL_broadcasting

The functions or possible contributions that radio can make to effective teaching must be regarded, for against these we must weigh the results; if they are not forthcoming, then the use of the radio in the classroom is not justified. Woelfel (48, pp. 40-41) informs us that radio "... can bring into the classroom a sense of the immediacy of events ... can annihilate space and create in boys and girls in the classroom a vivid sense that they are spectators of events while they are actually happening". Perhaps the best example of this is indicated by Sheehy (41, p. 123) when she cites, "... this trend is found in the 'Mike-ing History' Series, in which the man at the mike does on-the-spot reporting of historical happenings. Such events as the Johnstown flood, the Alexander Hamilton and Aaron Burr duel, the Trojan Horse stratagem, and the signing of the Declaration of Independence are reported with directness and sincerity".

The following ten questions are criteria useful for in-school listening experiences. In other words, will radio do this for the teacher?

CRITERIA FOR TEACHER EVALUATION OF PROGRAMS

1. Can the classroom instruction really be enriched?
2. Does it supply supplemental material beyond the teacher's resources?
3. Will its use provide economy of time and effort for the teacher?
4. Can it supplement the instructor in subjects, especially in rural areas in the fields of music, art, etc.?
5. Will it motivate such subjects as language, arithmetic, reading, hygiene, etc.?

6. Are the timely events given during school hours?

7. Are the authorities and experts talking on the student's level?

8. Does it challenge teaching procedures to a point of irritation?

9. Should curriculum changes or evaluations be made because of radio?

10. What part can the teacher play in obtaining desired radio material?

Assuming the broadcast is of educational importance, the questions to be taken into consideration in checking the worth would be as follows:

1. Is it consistent with the ideals of democracy?

2. Is it consistent with classroom curriculum?

3. Is it accurate and authentic in presentation?

4. Is full use made of the resources of radio?

5. Is it appropriate to the level of students?

6. Is the program clear and comprehensible?

7. Is it an experience both enjoyable and interesting?

8. Has the program promoted proper motivation?

TEACHER TRAINING REQUIRED TO UTILIZE RADIO PROGRAMS

Is special training required of the teacher in order to utilize effectively the radio as a teaching tool? One may readily sense there is a great deal more to the actual use of a radio as an aid. Teachers should be given experiences in the following:

1. How to prepare the classroom for a program reception.
2. How to prepare a class for listening.
3. What to do during the program presentation.
4. How to evaluate programs for content and applications.
5. How to follow up a program and cinch the material.
6. Understand the use of supplemental teaching aids.
7. How to select programs prior to the broadcast time.
8. Know the available sources of radio programs.
9. Know how to obtain services of radio stations.
10. Determine the suitable length of listening time.
11. Find time for use of radio along with class schedules.
12. How to correlate home listening with school work.
13. Understand the efficient operation of the radio.
14. Know how to take a tape recording from a live program.
15. Understand how to write the script for a radio program.
16. Perhaps know how to direct a group for radio programs.
17. Understand techniques for simulated radio programs.

It is one of the duties of the teacher-training centers to give the future teachers this background. It can be inculcated into one of the audio-visual courses or given as a separate unit of study as is many times found under the title of Radio Techniques, Radio Education, Classroom Radio Utilization, etc. It is safe to assume that to this course shortly will be added television and its application to education.
Education is in the process of growing up. Today this field is based on science — the scientific attitude of mind. In other words, people are getting together and using the scientific method to solve problems. It is not consistent with scientific method to teach and test the mastery based on the present curriculum without first building pre-structure or pre-planning.

In a sense, education is engaged in the task of teaching everything to everybody. The American family has changed so much during the last quarter century that many of the former educational functions have been lost. Because of this, teachers have and must concern themselves more and more with character education.

Where does radio fit into the picture just presented? What can we do with radio to bring about these upgrading procedures? Sheeby (41, p.121) sets forth the effect thusly: "Thanks to the radio and phonograph, the younger generation are better acquainted with the classics than ever before, and they are ready for new pastures". The tremendous influence of such programs as The American School of the Air, The Standard Hour, The United Nations, Chicago Round Table, Symphonies for Youth, Telephone Hour, and Halls of Ivy, just to mention a few, are known by and listened to by children. These listeners must be guided into these channels, and it is the teacher's duty to do this counseling.

The teacher is in constant daily contact with his charges — a relatively small group — and he has untold adventures in making his
teaching and directive thinking effective. True learning and development measured in terms of incorporated learned concepts into daily behavior patterns of students is never assured despite examinations. Such learning and changes depend upon the amount of interest and initiative which the teacher has been able to stimulate among the students. The teacher should provide the conditions whereby learning will take place in any field — he cannot provide the substance. Actual learning that really counts in life takes place only when a student is ready for it and makes enough self-willed effort to acquire techniques, skills, facts, and performance standards.

CRITERIA FOR DETERMINING BEHAVIOR PATTERN CHANGES

What factors can be objectively checked to determine any appreciable amount of gain after using audio-visual materials? Changes can be observed if certain desirable criteria are set up and observations made on student's gain. These criteria have been set up in tabular form for ready checking. This form may be found on the next page.

The possible behavior changes are not all given here, nor are they inclusive to meet many situations, but they will give a broad basis upon which the reader may base his observations and perhaps make a suitable set of criteria to meet his individual situation. This applies to teaching with audio-visual aids.

FACTORS DISCOURAGING RADIO UTILIZATION

So far, there has been discussion only on the merits of the radio in relation to its utilization as a tool for classroom teaching. Let
### Chart for Determining Behavior Changes

<table>
<thead>
<tr>
<th>STUDENT CHANGES:</th>
<th>No Change</th>
<th>Some Improvement</th>
<th>Greatly Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begins to show increased cooperation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintains respect for authority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evidences increased self-reliancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows ability to plan constructively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates initiative to go ahead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses reflective thinking upon own actions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes into consideration needs of groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shows increased gain in integrity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Starts to feel indispensable to society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tries to fulfill own obligations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accepts decisions of majorities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhibits the ability to carry responsibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willing to participate in governmental activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realizes responsibility to family, and family to self</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Realizes obligations of living in a free society</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
us now turn our attention to the factors which discourage the use of radio by the average teacher.

Criteria for Checking Disadvantages of Using Radio

1. Is the program on the student's level?
2. Is there too much contained in the program?
3. Does it move too fast for students to comprehend?
4. Does the student get lost in explanations?
5. Is it too verbose, thus losing interest?
6. Are specialists and authorities talking to children?
7. Are there too many characters talking?
8. Are there too many similar voices?
9. Are relationships clearly shown and concepts given?
10. Does the time fit into the class schedules?
11. Does the subject fit into immediate class curriculum?
12. Is the material free from propaganda and unbiased?
13. Does it promote attitudes such as tolerance, etc.?
14. Is the length of the program too long?
15. Is the program or presentation worth while?
16. Have teaching guides or manuals been furnished?
17. Are these supplementary teaching aids available?
18. Has the presentation furnished any motivation?

RECORDINGS AND TRANSCRIPTIONS

In the past few years there has been a tremendous awakening of interest in many types of recordings. In the field of children's
records alone production jumped from a yearly output of five million a few years ago to over thirty million in 1946 with a steady increase each year.

In order to obtain an over-all picture of the variety of recordings available, Whitney Records (10), a distributor on the West Coast, shows the following classifications:

1. Band Recordings
2. Choral Recordings
3. Dramatic Recordings
4. Folk Dance Recordings
5. Folk Ethnic Recordings
6. History Recordings
7. History of Music
8. Instruments of the Orchestra
9. Literature Recordings
10. Musical Talent Tests
11. New Music Horizons
12. Rhythm Band Recordings

This above company, after listing the general classifications, has further broken down this classification into the various functions of these records as:

1. Activity Records
2. Composer Series
3. Dramatic Plays
4. Fact and Folklore
5. Instrument Series
6. Listening
7. Studies in Music Forms
8. Participation
9. Sound Records
10. Other types
11. New Music Horizons
12. Rhythm Band Recordings

Upon examination of the individual records listed, another index is applied by an indication of the age-group level for the particular unit presented. There are many valid reasons for the use of recordings from the teaching standpoint.
Advantages of Using Recordings in the Classroom

1. Time schedules do not conflict with regular classes.
2. Records can be utilized when most appropriate.
3. Records can be thoroughly pre-heard and good lesson plans made.
4. Adequate printed guides are often available.
5. Selection for objectives can be made in advance.
6. Both strong and weak features can be anticipated.
7. Follow-up activities can have repetitive playings.
8. Portions can be replayed or repeated due to any distraction or interruption of the class.
9. The scheduled presentation may be deferred or postponed to a more convenient listening time.
10. Controversy or comparisons to other recordings or to known data may be cleared up by replaying.
11. The school record library can be accumulative.
12. All teachers have access to the recording library.

With the advantages of the use of recordings as listed above, it is natural to ask why they have not been more fully used by teachers. Woelfel (l.c., p.193) maintains "Teachers . . . need more fully to recognize the important contribution which recordings can make in providing dynamic and vital educational experience when they are effectively used". This, of course, directly reflects upon the amount of audio-visual training which has been taken by teachers. Therefore, it may be necessary to offer specific training to teachers in evaluating and weighing the educational aspects of recordings in order to become more fully aware of the content, value and use of the medium.
To Obtain Maximum Effectiveness of Recordings

Teachers should consider the following factors in an effort to obtain the utmost value from recordings:

1. Programs should be carefully selected for content and production on the age level of the group.
2. Operation of the equipment should be thoroughly understood to secure the best quality of presentation.
3. The class should be psychologically ready for the experience and know precisely the objective.
4. Students should have anticipation of the presentation whether it be a drama, poetry, or other type.
5. Planned follow-up activities should be utilized which can be stimulated by the listening experience.
6. Teachers should not depend or lean too heavily upon guides. Curricular needs should take precedence.

PLAYBACK MACHINES

In this section, playback machines and record players are terms synonymously used. Phonographs have for years been standard equipment in schools. The present transcription players are now beginning to replace them because of the more varied uses to which these can be put. Ordinarily transcription players are thought of as being able to reproduce phonograph records as well as play them. In the last several years there seems to be a tendency to call playback equipment by the term transcription player.

Selection of suitable equipment can be made only upon going through the process of checking features desirable for school usage. The following list has been compiled from experiments with various
types of these machines.

Evaluative Criteria for Selection of Playbacks

General Characteristics

1. The machine should be portable, equipped with a handle.
2. The machine should be self-contained with a cover.
3. The guarantee period should not be under ninety days.
4. A dealer should be within reasonable distance.
5. The amplifier unit should be contained in the case.
6. The case material should be sturdy and well built.
7. Be able to double as a PA unit (within reason).

Turntable Data

1. Turntable diameter should be at least twelve inches.
2. It should be able to play 33, 45, and 78 rpm.
3. There should be a speed variation adjustment.
4. A rim-drive is recommended over center spindle drive.
5. The type of the tone arm should be considered.
6. The machine should play from 7 to 16 inch records.
7. The tone arm should play standard and microgroove.
8. The tone arm should be secured when transporting.
9. The weight at the end of tone arm for cut and microgroove records should not exceed 2 ounces.
10. A semi-permanent needle should be included.
11. The needle should be a type that is replaceable.

Microphone and speaker

1. A good microphone should be included with the unit.
2. A microphone should be included in purchase price.
3. A dynamic microphone is better than the crystal type.
4. The speaker cord should be not less than 10 feet.
5. The speaker diameter should be at least 8 inches.
6. The speaker should be a permanent magnet type.
7. It is desirable to have more than one speaker.
8. Speaker cords should be 10 to 15 feet in length.

External Fittings
1. It is desirable to have more than one mic input.
2. The machine should have a separate trebel control.
3. There should be a separate control for bass.
4. The volume control should be separate.
5. The machine should contain a jewel light or other means of visually checking when current is on.
6. All switches, controls and connections should be simple and labeled.

TELEVISION

Educators have used the motion picture and the radio successfully for classroom presentation. Television may be likened to a combination of both motion pictures and radio. The immediacy of the situation utilizing television creates a more impressionable impact upon students; hence, a greater amount of learning in a shorter time can be the result. Since television is the newest addition to the educational field, there is not too much at the present time upon which criteria for this medium may be judged in a purely educational aspect. Broadly speaking, however, the objectives of television are the same as with
other audio-visual media. Therefore, evaluation of effectiveness would be upon the results obtained by its use.

Television has had a relatively short span of history. The iconoscope or eye of the TV camera was developed in 1923 by the Russian physicist, Vladimir Zworykin. The first transmission of television over a telephone wire took place April 17, 1927 from New York City to Washington, D.C. According to McNay (33), television was in the process of development as an educational medium as early as 1930 in Los Angeles. Yet, it was not until 1951, when General MacArthur landed in San Francisco, that the first national hook-up was put into effect.

Television in the Schools

Television in the schools is almost an old story in Philadelphia. A director and a staff of five people offer packaged shows to the three local TV stations, WPTZ, WFIL, and WCAU, who present them free of charge. School by TV was developed in Minneapolis when the schools were closed for three weeks because of a teacher strike during the winter of 1951. The complete experiment is written up (30) and is available in mimeographed form for those interested.

Educational applications (or intent to use TV) between 1949 and 1950 totaled two hundred. In the colleges alone, by January 1952, forty-five expressed a desire to go into television. At present the Iowa State College at Ames is the only educational station in operation. Some of the universities and colleges are offering "telecourses" or home study over commercial stations. Outstanding work is being
done by the Cleveland College of Western Reserve University at Cleveland. The University of California has a program offered for college credit entitled "Child Psychology".

The latest use of television on a strictly educational basis is the very recent week-long presentation (March 30 through April 4, 1952) over station WNBT-TV in New York City, entitled "Inside Our Schools". The presentation was given by WNBC, WNBT and the Life Magazine. No educational sponsorship, school or other type of institution was mentioned as a sponsoring body or even in a directive capacity.

Commercial Programs with Educational Material

While not directly connected with educational institutions, some commercial stations are offering programs which have excellent material for classroom use. While these are primarily in the east, a few of the programs are listed below for critical appraisal:

Mr. Wizard (NBC-TV). Employs familiar objects to teach children the near magic of science. Demonstrations of air pressure, etc.

Zoo Parade (NBC-TV). Brings animals from the zoo. Gives the child an opportunity to see such animals as hyraxes, flying foxes, etc.

Cameo Theater (NBC-TV). A program produced and directed by Albert McCleery. He has produced three twenty-two minute productions on Henrik Ibsen's "Peer Gynt" (2, p.5) showing on successive Sunday evenings. This is the first time any producer has tried over two consecutive installments.

Tales of Tomorrow (CBS-TV). Such stories as Jules Vern's "Twenty Thousand Leagues Under the Sea", starring Thomas Mitchell. (In two installments)

American Inventory. A program featuring current topics. One program called "The Future of the Presidency" and featured Dean Hacker of Columbia with students from the same school.
Harold Hainfeld maintains teachers can use much of the material presented in the regular programs. He points out (21, p.424) that in using these programs as homework the teacher must be certain that all students see an assigned program as well as the teacher. Secondly, the teacher should get as much advance information about TV program content as possible.

Science is an excellent medium to present on TV. The show entitled "The Nature of Things" on the NBC network has been especially helpful on the junior high and general science levels. Although there is a definite limit to the amount of material found in commercial programs which is useful, the same applications must be made by resourceful teachers to select and evaluate the usable, to focus attention upon the points which are emphasized.

Teacher Use of Television

As the medium becomes more widely used, teachers will wish to participate from the production angle. There are two possibilities: one, actually producing shows from the studio; the other, simulated programs in the classroom with dummy props. Both these procedures have definite learning contributions for students. Educational programs require a great deal of preparation for television and presentation (especially if they are to compete with commercial shows). Programs designed for in-school use can be prepared in much the same manner as using the techniques for putting on simulated radio programs.

For evaluating in-school reception of TV programs, there is almost a void of information. Outside of Philadelphia, where 670
school sets have been provided, serving some 27,500 children, there are few schools with TV sets. The Radio Corporation of America is now at work perfecting a system whereby TV can be projected upon a screen for greater audience participation. This screen has had some trial before groups. With such technological advancements impending, the day is not far removed when TV sets may become as common in the classroom as the globe or map.

Audio-Visual Materials and Television

A good rule to observe in television is: "If you can't show it, don't talk about it". Action is necessary in all television production. Assembly and disassembly is an effective method of showing visual material. Sketching an object before the eyes of the audience is very effective. Models and mock-ups are many times more effective than the real thing — and by virtue of the same reasons we use them in the classroom. As in the acknowledged use of all visual material, facts shown in relation to things people already know makes the battle half won.

Various types of visual materials which can be used to good advantage in televising are maps, graphs, photographs, charts, drawings, projected lantern slides, animated cartoons, filmstrips, motion pictures, and microprojection. As long as the object can be seen through the microscope it is not too small, and unless it is too big to bring into the studio it is not too large to be shown on television. Photographs, drawing, charts, and the like should be used exactly as
done in approved methods for classroom presentation by employing easels, music racks, and more emphasis should be given the flannel-board.

Motion pictures can be cut into the program at any point desired. They are generally used as a part of the opening sequence or inserted at such times when action shots take place which are not possible to do in the studio. When it is time for the movie, the demonstrator signals for the lights to go out, sets the projector in motion and seemingly starts the film. The purr of the projector adds a touch of reality.

TAPE RECORDERS IN AUDIO-VISUAL EDUCATION

The tape recorder is an outgrowth of the older type wire recorder which was developed by the armed services in World War I. The wire recorder is rapidly disappearing from the educational institutions and is being replaced by the more popular recorders using reels of plastic tape.

The principle advantages of this type of equipment is that one can record, play back or erase in one continuous operation. Temporary recordings as well as permanent types can be made at will. Metal tape has been replaced by both paper and plastic.

Most of the better machines available today employ either a speed of 3-3/4 inch run per second or 7-1/2 inch run. It must be realized that the faster the speed on the recording, the greater the fidelity. Commercial broadcasters as a rule use a recording speed of 15 inches per second. This is, of course, very expensive for the use of tapes
in the schoolroom.

Selection of a tape recorder is at the present about the same as selecting a radio for the home. A survey was conducted in the Audio-Visual Education Department of Oregon State College during January of 1952 on as many types of machines as possible, and the following factors were observed:

1. Thirty-two different machines were surveyed (not including "Professional" types used in the commercial or professional fields).

2. Prices ranged from $49.50 for the more complex machines to $99.50 for the simpler types. These were all advertised as "suitable" for school usage.

3. The weight ranged from 17 pounds to 55 pounds (the majority running from 32 to 38 pounds).

4. Four-fifths of these were listed as being portable; the others, table models.

5. Seven were single head recording; three were a choice of either single or dual head; and sixteen were dual head types. The others were not reported.

6. Tape speeds showed three at 1-7/8 inches per second; three at 3-3/4; eight at 7-1/2; one at 15; three at either 7-1/2 or 15; ten at 3-3/4 or 7-1/2 inches per second.

7. Speaker sizes ranged from 5 to 9 inches; some with permanent magnetic type and others the regular.

Other characteristics were tabulated in this study such as the "voice frequency", rewind speeds, type of construction on the case, method of winding tape, oxide in or oxide out on the reel, microphone inputs and phone connection jacks for extra speakers. From these findings and experimental work with the machines, much has been learned regarding the typical characteristics desired of tape recorders. The following criteria is desirable and while listed here, there may be additional determinants in purchasing equipment, such as the local
school budget, nearest source of purchase, service, and other local requirements.

For evaluation of the tape recorder consider these points carefully:

1. The manufacturer should be one of the reliable well-rated firms.

2. Be certain the machine is actually manufactured by the firm whose name appears on the label.

3. Wire recorders are seemingly on the way out. Do not compromise by getting equipment which will be obsolete in a few years, or is now.

4. Be careful of bargain sellers.

5. Be certain there is an agency near enough to make repairs and use bonafide parts in repairing.

6. Before purchase make certain that the agency will loan a machine while the other is being repaired.

7. Do not let any but qualified electronic experts work upon tape recorders.

After the above factors have been given due consideration, it is pretty certain that a fairly reliable machine will be obtained. The following physical characteristics are desirable:

1. The machine should not weigh over 140 pounds. Some states such as Washington will not allow women to handle equipment weighing more than this amount.

2. The recorder should be portable and equipped with a completely enclosed case and carrying handles.

3. The medium price at this writing ranges around $200. These machines are suitable for most all classrooms.

4. The purchase price should include a good microphone. The dynamic microphone is better than the crystal.

5. Most tape speeds are now at 7-1/2 inches per second.

6. Dual tape speeds are no more costly, but it is wiser to have the 3-3/4 and the 7-1/2 inch per second.
7. The faster the tape plays the greater the fidelity is obtained on the recording.

8. The majority of machines now wind the tapes with the oxide side in (toward the hub of the reel).

9. Dual recording heads are preferable to the single recording heads.

10. Do not consider how fast the machine will rewind the tape as a criterion. The tape is made of plastic and all plastic will stretch.

11. As a rule all speakers built into a recorder will not give nearly as much sound as is actually on the tape; an output to attach larger speakers is desirable.

12. An output for use with a pair of headphones is desirable for monitoring material being recorded on tape.

13. Several inputs for plugging in microphones are more desirable than just one. These are especially useful for recording more than one voice such as in round-table discussions, dramatic presentations, etc.

14. An input for use with the radio or phonograph is useful. This allows music or other sound to be recorded electronically without a microphone.

15. Try to have all connections (plug-ins, jacks, inputs, or outputs) of standard type so that interconnections with other equipment such as speakers, microphones, phonographs, radios can be made.

**ACTIVITY MATERIALS**

Under this heading may be grouped all of the audio-visual techniques which are utilized by students' activity, teachers' activity, and combination of both the student and the teacher. These could be classified in the following manner:

1. Demonstrations by the instructors; the student is the observer.

2. Demonstrations by the student; the instructor is the observer.

3. Demonstrations by the instructor and the student together.

4. Dramatics where the student is merely a passive onlooker.
5. Dramatics where the learner is an active participator.

6. All types of manipulative experiences where the learner is active.

7. Field trips or exploration outside the classroom.

MATERIALS NOT EVALUATED IN THIS THESIS

The time element as well as size of this thesis precludes the discussion of the activity materials of audio-visual education. It has not been slighted because a feeling that actual worthiness is not present. Indeed, quite the contrary, for these areas are some of the most important involving the use of both audio and visual techniques. Definite preparation must be done by the teacher in regard to methods of presenting (or conducting) and follow-up procedures in order to obtain efficiency in the learning process.

There are other items, both specific and general which should be given much thought, consideration, and analyzed into listed form for evaluative purposes. These are recognized and have not been left out of this paper intentionally. More research should be done in the following fields in much the same manner as presented in analyzation for the various criteria.

1. The opaque projector; consideration of the major types now available.

2. The filmstrip or 2 x 2 inch slide projectors.

3. The overhead transparent projector possibilities.

4. Teacher-made 3 1/4 x 4 lantern slide functions.

5. The use of crepe paper in displays and exhibits.

6. Room darkening factors, costs, and materials.
7. Classroom environment in relation to audio-visual education.

Many more areas should be thoroughly investigated. A list of suggested items may be found in the following chapter. It is hoped that the several areas, equipment and techniques analyzed in this section have pointed the way for further study. If possibilities have been shown, motivation will become more impelling toward realization of effective instructional use with audio-visual teaching aids.
CHAPTER V

TEACHER TRAINING, RECOMMENDATIONS AND CONCLUSIONS

TEACHER TRAINING IN AUDIO-VISUAL EDUCATION

It was simply stated in the beginning of this thesis that effective utilization of audio-visual devices, equipment and materials were entirely dependent upon the teacher. It is emphasized that the materials in question are not teachers themselves; the materials are not to supplant but to supplement the teacher. Audio-visual techniques properly applied will lower the high cost of forgetting, and good results are dependent upon a trained teacher.

The function of audio-visual materials has been part of the criteria upon which much of the evaluation has been done throughout this work. We may reasonably expect that the objectives can be attained by correct usage, but if the function and the objectives have not first been analyzed and the selected teaching aid evaluated for its effectiveness, the user will end up in a blind alley.

What of the poor teacher who has been exposed to one (at most two) brief course in audio-visual procedures? What of the many thousands of teachers now in the field who have had no opportunity for even a survey course in audio-visual methods?

Motivating Teachers to Take More Training

The Multnomah County, Oregon, schools (43) allow teachers who become audio-visual coordinators the additional sum of $250 a year
providing they spend more time than the regular scheduled school day.

In January 1947, the California State Board of Education sent out a directive (1-4, p.3) to the effect that all teacher-training institutions "... maintain a course, or the equivalent, of at least two semester-units in value in audio-visual-radio education and require such course to be successfully completed for one or the other of the credentials listed ..." These credentials include kindergarten-primary, general elementary, junior high school, general secondary, and junior college issued after July 1, 1947. At the present time, there is no requirement to take any course in audio-visual education for certification of teachers in Oregon.

In a conference conducted by the United States Office of Education during 1950, Floyd E. Booker, Chief of the Visual Aids to Education, answered the question about noting the use of the advantages of audio-visual materials and techniques. He stated (8, p.112) "... an entire generation of teachers, of college faculties, and of educational administrators must go to school again to achieve a mastery of the new media, for the motion picture, the recording, and the still picture call for instructional methods quite different from traditional ones. It involves the education of specialists in the field of audio-visual education. The task includes the education of administrators of school systems and colleges". The sum total thus far seems to be the need for greater training of the audio-visual program on all levels of the educational and productive fields.

The administrators may be the fulcrum for the in-service training of teachers. It may be introduced by the principals of elementary and
secondary schools, the individual advisors in colleges, or the deans of various schools on college and university campuses. Still further, the motivator may be an entirely foreign outside influence altogether as in the case of the University of Omaha. This came about primarily through the centering of a survey on their campus, the "Nebraska Program of Educational Enrichment Through the Use of Motion Pictures". At the end of the fourth and final year of the experiment there were only a few departments and instructors who did not make use of motion pictures.

Objectives of Teacher Training in Audio-Visual Education

Stenius (42, p.246) observes that further study and greater attention is needed to validate the effective use of audio-visual materials by teachers in stating, "... instructional aids are tools to be used by the teacher and not intended to do the instructional job by themselves, the teacher becomes a very large factor in any investigation of their values". The instructor must always be the most essential part of any concept in education. In order to realize the inherent values in working with audio-visual teaching aids, the instructor should have certain background knowledge, concepts and presentation skills or techniques. These requirements will vary according to the physical facilities and equipment of the various schools; also, in ratio to the background and abilities of the instructors teaching audio-visual education. There is constant change, especially in the scope of audio-visual aids. Witt (47, p.113) verifies this in stating, "Acquiring the knowledge and skill essential to effective
utilization of audio-visual materials is a process of growth and
development which is never completed. There are always innovations
in the field of education. This has been especially true in the
audio-visual field during recent years. Many new kinds of equipment
and materials have been produced. Regardless of where or by whom
these techniques are presented, there are basic requirements for all
teachers. The following outline gives the two primary divisions and
their component parts.

Desirable Understanding and Knowledge

After completing courses in audio-visual education the individual
should have attained to a usable degree the following:

1. Have a background in the development of audio-visual education and
   its relation to current practices as well as its implications to
   future trends.

2. Know logical procedures of setting up an audio-visual program in a
   single school or group of schools.

3. Understand the services and functions of an audio-visual depart-
   ment; know how to coordinate with an audio-visual department.

4. Be able to use the principles of good teaching which affect the
   use and selection of audio-visual teaching aids.

5. Know methods and ways of procuring, storing and maintaining various
   types of audio-visual materials.

6. Understand the philosophical and psychological factors involving
   the use of audio-visual aids in the classroom.

7. Know the various types and sources of materials available in
   specific teaching fields as well as their educational worth by
   self evaluation.
8. Thoroughly understand the limitations as well as the educational values of audio-visual teaching techniques and materials.

9. Have some knowledge of past studies in research in audio-visual education and their implications upon present and future usage.

In addition to the above nine desirable factors, the individual teacher should be able to obtain certain other constructive abilities or manipulative skills from audio-visual educational courses. These abilities and skills will include the following:

1. Be able to set up standards or evaluative criteria by which valid judgments may be made.

2. Be able to appraise the technical quality and the educational worth of audio-visual equipment and materials according to the criteria developed above.

3. Select wisely the aids and tools to meet the needs and requirements of students on various levels.

4. Be able to use each audio-visual tool with dynamic and effective force in the classroom situation.

5. Be able to refine, improve, or modify future teaching practices by an evaluation of its past effectiveness and amount of student retention.

6. Be able to correctly assemble, operate, and make simple maintenance services on various audio-visual equipment.

7. Provide suitable and receptive classroom environment and physical conditions suitable for using these techniques.

8. Know how to make a community resources survey and plan and execute a field trip successfully.

9. Be able to plan and produce simple materials, such as charts, posters, bulletin boards, flannelboards, slides, models, and other aids.

10. Know the basic principles involved and be able to prepare and install exhibits and displays both in school and in the community.
Present Handicaps from Lack of Standardization

Audio-visual techniques of teaching and evaluations of its effectiveness are now going through a period of educational investigation. These have claimed the attention of researchers in the various areas of the field. Probably the greatest single deficiency shown in all investigations to the present has been an almost total lack of standards in all phases of audio-visual education. Variations exist in requirements for certification of teachers, in content of courses, and in units or semester credits. There is no set amount of work required of students in the scope of the material to be covered or in the abilities of attainment.

Holy (26, p.287) shows in 1950, "Only one-third of the teachers in Oregon have had training equivalent to a college course in the use of audio-visual instruction materials ... the majority of teachers in the state are greatly in need of in-service training in the use of audio-visual aids". In regard to the amount of college attendance by teachers already serving in Oregon schools, there is evidence to show that at least three out of every four teachers have attended some type of college class on a campus within the last six years. Holy (26, p.271) affirms that, "... 95 per cent of all Oregon teachers have taken courses from the Extension Division of the State System of Higher Education".

Ludeman (31, p.630) in speaking of college instructors maintains, "There appears an impression that college teachers who have acquired advanced degrees — either Master's or Doctor's — because of that
fact automatically become great teachers. Nothing could be further from the truth. Some of the poorest teaching we have is found in the college classroom."

Perhaps there is not enough audio-visual education offered on the graduate level, or perhaps the offerings are too limited. To be most effective, the audio-visual courses should be started in the freshman year and continue through to graduation, with specialized courses on the level of graduate work for the higher degrees.

At the present time there are only a few colleges with advanced work in audio-visual education, and only a few specialized courses. Yet, it is expected of the educational trainers to turn out qualified personnel to teach the subject in colleges, to become directors of audio-visual education in school systems, and to become coordinators in counties. Where are they to get this training unless the opportunity and the courses are provided?

Of course, there is the old question, "Do we teach as we were taught, or as we were taught to teach?" The technique should be used in every class, in every course throughout college. Painter and Welch (36, p.37) makes this pertinent observation in relation to their survey of the use of visual aids in teacher training, "A few replies urge that college teachers should make greater use of visual aids in classes attended by prospective teachers. The reasons given are that such use would be a direct contribution to the economy and quality of learning in college classes; that it will provide examples of how to use such aids as a part of the teacher education program; and that high school teachers, especially, do teach their high school subjects
in much the same manner as they were taught during their four years of college".

What about the personnel responsible for such a training program? Admittedly, there are many qualifications which should be considered in answering what kind of philosophy and general knowledge a teacher trainer should have. In order to achieve well-trained teachers the following are considered essential for the leaders:

1. Have a good understanding of the philosophical and psychological factors underlying the function of audio-visual education.

2. Know the procedures; be able to encourage and direct students to do research in the field of audio-visual education.

3. Keep abreast of the movement and trends; know the latest developments in both technological and educational practices. Continually do research in methods and applications.

4. Be familiar with significant literature in all trade magazines, and educational journals; preview or evaluate all textbooks in education dealing with applications and/or use of audio-visual techniques.

5. Have an understanding of the important research studies in the field and know the implications of these studies.

6. Lend support to plans and movements designed to strengthen audio-visual education as well as contribute to the movement by articles, research or other means.

7. Have a wide background or actual teaching experience in all levels of instruction from the elementary grades through college.

8. Have the "inner spark" of creativeness; be able to pass this along to students by making definite concrete suggestions and ideas to produce materials, plans, and the like.

CRITERIA FOR AUDIO-VISUAL COORDINATORS AND DIRECTORS

From where are the qualified personnel for the school systems obtained? It is felt that a two-year program should be set up with
the aim of developing teacher trainers, coordinators, and directors or other audio-visual specialists. Broadly speaking, the training should include courses which would encompass the following techniques and skills:

1. Projection of all types of materials, using all types of machines.
2. Knowledge and use of all types of flat materials including maps, etc.
4. Elementary servicing, maintaining, repairing and upkeep of all of the equipment now in use in audio-visual education.
5. Thorough knowledge in radio education including FM and AM production, classroom usage of the radio, and simulated radio programs.
6. Good knowledge of television, past projects and research, procedures, costs, and methods of having teachers use the medium with own classes.
7. Techniques of procedures, evaluations, presentations, making resources surveys, follow-up activities of field trips.
8. Methods of producing materials including molding, casting, plastic imbedding, slide production, photography slide methods, making filmstrips, and motion picture techniques.
9. Understand and know how to set up an audio-visual program for school systems, school boards and counties. Have knowledge of programming, requisitions, bookkeeping systems and cataloging procedures. Know approved methods of storage, filing, and maintaining routing procedures.
10. Be able to set up and conduct teacher clinics, workshops, seminars and research projects in audio-visual education.
11. Be able to adequately supervise the production of printed teaching aids. Be able to make evaluation checks and guides for any teaching tool including textbooks, specimens, dioramas, and other specialized areas.
12. Know the fundamental procedures of producing teacher's guides, manuals and handbooks to go with materials where there are no printed materials available.
13. Understand and know the possibilities and limitations of the state school libraries in relation to their function as a coordinating point of the cataloging of information and other pertinent data on audio-visual supplies, materials, etc.

Stenius (42, p.244) points out that "Research in the field has reflected the status of the program in the schools. There has been no continuous pattern of investigation that has proved that the use of visual or auditory aids resulted in increased instructional effectiveness with one that has shown no added benefits to pupils".

Much independent thought and some action has been carried on by individuals in scattered areas. Until the time these independent efforts can be brought together and evaluated upon proven results there will be no agreements, for it is the product of the result which is the final answer.

The audio-visual field has shown an increased growth each year. Kinder (28, p.341) in reviewing investigations and literature in visual education found "that research is being carried on in nearly all the learning institutions of higher learning in some respect of visual education. Many of these researches are being done in connection with the master's degree, but more and more doctoral work is in evidence ... such areas as artistic and esthetic judgments, attitudes, and learning processes await much fuller treatment and development". With many competent people doing research on the problems of audio-visual techniques and so much capital financing these developments, the future of audio-visual instruction will doubtless represent a great improvement on those of today. Bean (6, p.134) believes we are on the verge of new and important developments. Hansen (22,
pp. 239-240) and Reed (38, pp. 619-623) have outlined in detail fruitful fields for investigation in audio-visual education.

Areas for Research on the Master's and Doctoral Level

Much thought and independent research has been going on in an attempt to determine effectiveness of audio-visual techniques. These studies have taken place in classrooms, colleges, and in controlled schools by independent researchers. Much of this work, such as Freeman's (20) has been foundation-financed and has covered a great deal of work using associates, entire school systems and other methods. Stenius (42, p. 241) in reviewing research in this field has reflected, "... even on points where results of research have been fairly constant, study has not always been on currently vital problems".

The major determinant needed in further research should be the amount of gain on the part of students. What is probably needed for a secondary type of study is the effectiveness of teaching with audio-visual. These advanced investigations then are desirable in the following areas:

1. If retention of knowledge is greater, what is the gain and duration of this gain?

2. If the learning processes have been shortened, how much was accomplished, and was the retention as great?

3. What types of complex or difficult subject areas can best be handled with audio-visual methods?

4. If audio-visual techniques will promote more pupil participation, to what extent will it accomplish this?

5. To what extent does the use of audio-visual techniques in teaching motivate students to further research?


4. Bandy, Eleanor K. Curriculum laboratory of Yolo county schools, 1938. (mimeographed)


30. Long, Madeline. Video school - Minneapolis public schools and W7CH-TV. 20p. (mimeographed)


