

1950

A Study of Teacher Constructed Audio-Visual Aids

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A STUDY OF TEACHER CONSTRUCTED AUDIO-VISUAL AIDS

by

Marvin Joseph Schroeder

A thesis submitted in partial fulfillment of the requirements for the
degree of Master of Education, in the Graduate School of the
Central Washington College of Education

June, 1950

APPROVED FOR THE GRADUATE FACULTY

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ACKNOWLEDGMENTS

The writer is indebted to Professor Charles W. Saale for guidance and direction in this study.

Special acknowledgments are gratefully accorded to Professor A. J. Foy Cross for his assistance in selecting the problem, and to Associate Professor Crum for his suggestions and assistance.

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Chapter I

INTRODUCTION

Children, at the present time, need to learn more than they have ever comprehended previously in history. Man's environment has been extended from the community beyond continental limits into an active world society. This extended environment has dictated the need for a larger number of learning experiences by our children. The one room school with simple educational objectives is being replaced by larger educational plants that must provide a complex aggregation of learning experiences for the learner. The needs of children being prepared to participate in a secular environment molded by imposing social forces and advancements of science, can no longer be satisfied by rote learning of the three R's. These same forces which aided in forming the complex nature of our environment have helped provide teachers with more effective tools for learning. Some of these new tools have been classified as audio-visual aids to learning.

Much of the educational value claimed for audio-visual materials has been determined by research. A bulletin prepared by the Pasadena City Schools¹ summarizes many of the specific values of audio-visual

1. Pasadena City Schools, "Audio-Visual Education in the Pasadena Secondary Schools," Bulletin No. 16. (Pasadena, 1949), 7-13.

materials as shown by educational research. These values are claimed to be:

1. Audio-visual materials serve as an effective means of presenting all kinds of factual materials.
2. Audio-visual materials make learning more permanent.
3. Audio-visual materials have a definite effect on attitudes and behavior responses.
4. Audio-visual materials stimulate thinking and can be used to teach the ability to think.
5. Audio-visual materials are powerful means of gaining and holding the interest of the learner and of compelling attention.
6. Audio-visual materials can be of help in the development of habits and skills.
7. Audio-visual materials are a means of bridging inequalities of pupil experiences and to a limited extent, pupil ability.
8. Audio-visual materials in certain subjects can effectively teach large groups of learners at the same time.
9. Audio-visual materials in the long run are less expensive than many other kinds of instructional materials.
10. Audio-visual materials increase the amount of voluntary reading.

The values of audio-visual materials received further emphasis by Wendt¹ who states, ". . . many experimenters have proven the very real contribution which all types of audio-visual materials make to learning."

The use of audio-visual materials as aids to learning extends far back into the beginnings of recorded history. Carroll² briefly

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1. Wendt, Paul, "Social Learning Through Audio-Visual Materials," Audio-Visual Methods and Materials. Eighteenth Yearbook, National Council for the Social Studies, (Washington, D. C., 1947), 1.
 2. Carroll, John S., Teacher Education and Visual Education for the Modern School. (San Diego, 1948), 9-17.

summarized the historical background of the use of audio-visual materials. Pictographs and clay baked picture inscriptions are mentioned as being among the earliest audio-visual aids. He states that the use of similar materials to assist verbal instruction was later justified by the intellectual leaders of the day, notably Cicero, (B.C. 106-43), Seneca (B.C. 4-A.D. 65) and Quintilian, (A.D. 35-100). "During the Middle Ages the church used frescoes, statues, carvings and marionettes to teach its religious lessons to the people."¹ In the seventeenth century, the work of Comenius, who so strongly urged the use of concrete aids to learning, provided the well illustrated textbook, The Orbis Pictus, to support his contentions. Commenting upon the writings of Comenius in the preface to The Orbis Pictus, Dale² remarks: "Comenius' preface contains statements as modern as anything that could be said about Life, Look or Building America." Educators such as Pestalozzie, Rousseau, Frobel and Herbart gave additional impetus to the use of audio-visual aids through their writings. The use of the stereoptican in teaching was defended in 1890. During the first part of the twentieth century, numerous research studies on various phases of audio-visual aids have been conducted. The majority of these studies has been associated

1. Carroll, John S., op. cit., 9.

2. Dale, Edgar, Audio-Visual Methods in Teaching. (New York, 1947), 56.

with educational films as audio-visual aids. So much emphasis has been placed upon the audio-visual aids that require mechanical devices for use, that some writers in this field make only brief reference to, or do not consider at all, the broader viewpoint of audio-visual teaching materials. Such a viewpoint would recognize a wide variety of audio-visual materials including both the projected and non-projected types. The non-projected audio-visual aids would not be excluded by implication or neglect. Carroll¹ points out that with the advent of the sound picture, "School people were asked to consider it as a new means and method of education and, by implication if by no stronger means, the others of the visual aids were consigned to minor roles."

This narrow point of emphasis has contributed to the development of some misconceptions regarding the construction and utilization of audio-visual materials. Educational films and audio-visual aids are not synonymous terms. There exists a wide variety of audio-visual materials that are capable of making real contributions to more effective learning. A number of these do not require elaborate and expensive projection equipment nor is it necessary that they be commercial productions. Teachers have for many years found methods of helping the learner to obtain the needed basic experience essential to understanding. Terrain models constructed from flour,

1. Carroll, John S., op. cit., 27.

salt, and water have helped pupils understand physiographic concepts, teacher constructed models and symbols of Indian villages have given more meaning to studies of Indian life, and a square glass box has been effectively utilized in teaching perspective drawing in drafting classes.

A complete list of such examples would be practically endless. These materials are audio-visual materials. They fulfill a real need. They should be as much a part of the total teaching program as textbooks, films and other more frequently mentioned learning materials. A study that determines which teacher constructed audio-visual aids are valuable for classroom use would be of significance in improving instruction.

Nature of the Problem:

Definitions of audio-visual aids to learning have varied considerably and the writer would like to briefly develop the connotation for audio-visual aids ascribed to this study. The Dictionary of Education¹ defines audio-visual aids as "any device by means of which the learning process may be encouraged or carried on through the senses of hearing and sight simultaneously." Some authors have defined audio-visual aids in terms of their function, and have given

1. Good, C. V., Dictionary of Education. (New York, 1945), 18.

to such functions the term visual education. Carroll,¹ in his study Teacher Education and Visual Education for the Modern School, states, "For the purpose of this study visual education is defined so the major emphasis is placed upon the concrete aids that function for the most part through the audio-visual-sensory channels." Monroe² develops this concept further and says,

The term "visual education" usually applies to the changes in behavior which result from the school utilization of such materials as the following; (a) motion pictures, silent and sound; (b) school journeys (also popularly labeled, "field trips" and "excursions"); (c) still pictures, which may be viewed directly or projected in the form of film slides, film strips, or glass slides; (d) museum materials, models and exhibits; (e) charts, maps and graphs. The term "visual education," while psychologically a misnomer, is used in the meaning of the integration of sense experiences on the basis of visual material. Wheeler and Perking say on this point, the ear alone does not determine what the nature of an auditory experience will be. The meaning of an object will not be apprehended until it is perceived in the light of a total situation with the aid of other senses."

Several writers in this field have defined audio-visual aids in terms of the ability of the materials to present auditory and visual experiences in varying degrees of concreteness. Dale³ visualizes this concept with his cone of experience. At the base of the cone are the direct first hand experiences with reality. At the apex of

1. Carroll, John S., op. cit., 41

2. Monroe, W. S., Encyclopedia of Educational Research. (New York, 1941), 1323.

3. Dale, Edgar, op. cit., 37.

the cone are placed the materials appealing to the most abstract type of learning. Dale¹ states, "As you study the cone, you recognize that each division represents a stage between the two extremes—between direct experience and pure abstraction." Similar expressions of this concept are presented by Hoban² and Olson.² For the purpose of this study, the investigator suggests the following definition: Audio-visual aids are those materials that implement learning, by presenting through the visual and auditory senses, experiences, either real or vicarious.

The special type of audio-visual materials considered in this research can now be further differentiated as being those constructed by the classroom teacher. At the outset, it should be recognized that many of these aids can be constructed by pupils under the guidance of the teacher. This procedure may provide excellent learning experiences for the pupil, as well as the development of useful aids to learning. The responsibility for the production of the aid, however, rests with the teacher. All materials considered as teacher constructed audio-visual aids will include those produced in the

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1. Dale, Edgar, op. cit., 37.
 2. Hoban, Charles F., Hoban, Charles F., Jr., and Zisman, Samuel B., Visualizing the Curriculum. (New York, 1937), 23.
 3. Olsen, Edward G., School and Community. (New York, 1949), frontispiece.

classroom by or under the direction of the teacher.

The use of audio-visual aids in the classroom has not taken place without justifiable criticism of these learning materials. Monroe¹ points out that frequent administrative criticisms are: (a) they are too expensive and (b) they are too difficult to obtain and distribute. A brief analysis of these two criticisms will provide a background for the development of the problem considered in this study.

According to Hoban,² the relatively high retail price of audio-visual materials is partly due to production costs and partially due to the small market resulting from limited scope and degree of applicability of these materials. Commercially produced audio-visual aids need to have a high distributive market value to amortize the production costs and maintain an acceptable sales price. To find an extensive market, such materials necessarily must be general in scope or meet a widely prevalent need. On such a basis, commercially produced materials cannot meet all of the classroom needs for audio-visual aids.

Audio-visual aids are most effective if they are used when the learner is psychologically ready for the experiences the aids present.

1. Monroe, W. S., op. cit., 1323.

2. Hoban, Charles F., "Obstacles to the Use of Audio-Visual Aids," National Society for the Study of Education. Forty-Eighth Yearbook, Part 1. (Chicago, 1949), 53-56.

Maximum availability of audio-visual aids is essential for effective utilization of these materials. Hoban¹ concludes that although availability of materials alone does not insure effective use of these materials, effective use is obviously impossible if the materials are not available. The problem of availability may be considered to be one of distribution, only if such materials are available for distribution. Smith² comments on this point and says, "School systems have not, as yet, approached the stage where all the needed materials can be found on hand for distribution to the classroom teacher. Hoban³ has pointed out that this inadequacy is a common characteristic in some schools.

Sufficient quantities of audio-visual materials may not be available to meet all of the needs of the classroom teacher. Some of the material that is available may not be readily adaptable to the specific learning objectives the teacher has developed with the class. Can some of these needs for audio-visual aids be fulfilled by utilizing materials constructed by the classroom teacher?

During World War II, notable examples of affirmative answers to the above question were in evidence.

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1. Hoban, Charles F., op. cit., 56-57.
 2. Smith, T. E., "Class-made Visual Aids With Sound Effects," Social Studies, 33:175-76, April, 1942.
 3. Hoban, Charles F., op. cit., 59.

Miles and Spain¹ report,

In the early days of the war, instructors had few resources for and little assistance in, illustrating and implementing the generally brief statement of objectives, methods, and content of official courses of study. Yet it was the accepted doctrine to prepare, explain, and demonstrate and there were usually few textbooks to use as a last resort. Hence, everything from gunnysack to salvaged wood and metal was used by instructors in improvising crude devices to visualize instruction.

Exton,² writes about the difficulties encountered by navy instructors during the first part of World War II. He points out that many of these instructors frequently constructed their own audio-visual aids to meet specific teaching needs. " . . . 'primitives,' crude charts drawn on wrapping paper, and crude models were manufactured from any material at hand." He concluded, "Many a navy man would have gone to sea with less knowledge if these crude training aids had not been provided."

In discussing the development of audio-visual aids for classroom use, McCafferty³ states, "A substantial part of the army program has developed around photographs, charts, diagrams, graphs, and pictographs. These can be made effectively in the classroom and for an

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1. Miles, John R., and Spain, Charles R., Audio-Visual Aids in the Armed Services: Implications for American Education. (Washington, D. C., 1946), 33.
 2. Exton, William, Audiovisual Aids to Instruction. (New York, 1947), 4-5.
 3. McCafferty, R., "Developing Visual Materials for Classroom Use," National Education Association Journal, 33:521-22, Nov., 1946.

amazingly small cost in dollars and cents."

Other writers in this field have made reference to the efficacy of teacher constructed audio-visual materials. March¹ discusses several types of teacher and pupil constructed audio-visual aids and concludes, "Years of experience have proved them to be practical and effective aids to teaching." Hart² writes that materials produced in the classroom can be tailor made to meet local needs. Chandler and Cypher³ assert that many of the most valuable and effective teaching aids are those which have been made either by the teachers themselves, by the students, or by the teachers and students working together after formal classroom time. Clark⁴ states, "Pupil made visual aids, when intelligently utilized make rich contributions to learning."

Classroom utilization of audio-visual aids need not function solely within limits established by the availability of commercially produced learning aids. Small amounts of inexpensive materials can

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1. March, L. S., "Homespun Tools of Learning," School Executive, 63:18-20, Aug., 1944.
 2. Hart, W. G., "What Visual Aids Are Schools Producing?," Educational Screen, 20:154-55, April, 1941.
 3. Chandler, Ann Curtis, and Cypher, Irene F., Audio-Visual Techniques. (New York, 1948), 97.
 4. Clark, E. C., "We Make Them Ourselves," Educational Leadership, 2:66-68, Nov., 1944.

be converted into useful audio-visual aids by the resourceful teacher.

Zehr¹ concludes, "The use of visual aids is limited only by the ingenuity of teachers and pupil. We mean by this that the resourceful class will not lack for suitable visual aids to stimulate and develop its thinking."

Since teacher constructed audio-visual aids can make worthwhile contributions to the learning environment, information concerning the various types of aids now being used in public schools should be available to school teachers and administrators. Additional information related to the construction and utilization of these materials would also seem to be of value.

The purpose of this study is to determine which teacher constructed audio-visual aids, as evaluated by a sample of audio-visual coordinators, are considered to be the most valuable for classroom use and which materials and equipment are needed for the construction and utilization of these aids.

1. Zehr, W. M., "Classroom Built Visual Aids," Scholastic, 47:51, Jan., 14, 1946.

Chapter II

REVIEW OF RELATED WRITINGS

This review of related writings presents selected material on topics related to teacher constructed audio-visual aids. The topics are considered in the following order: research in audio-visual education, general writings about teacher constructed audio-visual aids, and important remarks about special types of teacher constructed audio-visual aids.

Considerable research has been done in the area of audio-visual teaching materials, however, the major part of the research and writings has been devoted to motion pictures in education. Few studies have been made in the specific area of teacher constructed audio-visual aids.

Kinder¹ summarizes the amount of research devoted to the audio-visual field prior to 1938. Of the two hundred and thirty-six studies reported during this period, one hundred and eight were related to motion pictures; ninety-six were concerned with general audio-visual aids and instruction; twenty-one were related to flat pictures and other illustrative material; seven were associated with

1. Kinder, James S., "Research in Audio-Visual Education," Educational Screen, 18:360-61, Dec., 1939.

slides and the use of the stereoptican, and four were classified as miscellaneous studies.

A recent survey of research in the audio-visual field is presented by Dale, and others.¹ Of the one hundred and sixty-three studies summarized, only three were directly related to the area of teacher constructed audio-visual aids. The authors² reported a study by Powell who recommended, "The schools must eventually develop their own visual agencies which will produce materials and work cooperatively with existing museums." Zyve³ reveals the relative effectiveness of lantern slides as an aid for teaching arithmetic combinations, as compared with the blackboard. She concluded, "Two days of teaching arithmetic combinations with the lantern slides gave approximately the same results that three days teaching gave when using blackboard presentations." A study by Vauter⁴ is cited as indicating significant value for hand made lantern slides.

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1. Dale, Edgar, Finn, James D., and Hoban, Charles F., Jr., "Audio-Visual Materials of Instruction," National Society for the Study of Education. Forty-Eighth Yearbook, Part 1. (Chicago, 1949), 253-93.
 2. Ibid., 281.
 3. Zyve, Claire T., "Experimental Study of the Teaching of Arithmetic Combinations," Educational Method, 12:16-18, Oct., 1932. Quoted by Dale and others, Ibid., 280.
 4. Vauter, Sibyl, "Varied Uses of Slides in Intermediate Grades," Educational Screen, 21:178-79, May, 1942. Cited by Dale and others, Ibid., 280.

It should be noted that research related to the development and use of teacher constructed audio-visual aids is not limited to educational institutions or problems. A Department of Agriculture¹ publication reports a study by McClintock that claims the present use of visual aids in extension work, and the seeming trend in the use of such aids indicate that the would-be successful extension worker might well acquaint himself or herself with the use of a 35mm. camera for producing colored slides.

Moore, Embry, and Benson² suggest materials and procedures which may be utilized by teachers for the construction of relief maps in studies of communities. The need for teacher constructed teaching materials was introduced by the authors who claimed:

Regardless of how well any classroom may be equipped with commercially produced materials, there is a point at which the teacher has the responsibility for bringing in visual evidences of what is happening in the pupils' own local community environment. Obviously it is not always economically feasible for commercial groups to produce materials about every local community, yet this is the point at which the teacher's responsibility for local production must take over. How can she bring into the classroom a tangible, vivid, graphic evidence of, for example the terrain in which the local community is situated? One way of accomplishing this is the production of a terrain model.

The teaching aid developed as the result of a positive need based

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1. United States Department of Agriculture Extension Service, What Research Shows About Visual Aids: Movies, Slidefilms, Exhibits, Pictures, Charts, Posters. (Washington, D. C., 1949), 31.
 2. Moore, Lyell J., Embry, Henry W., and Benson, Esther M., "Mapping the Local Community," See and Hear, 2:38, May, 1947.

upon experience, is usually a good one. Weaver and Bollinger¹ have written extensively about the construction and use of teacher constructed visual aids. The authors state, "The most effective and useful visual aids are those specifically designed to satisfy special needs." They assert that those who wish to teach both effectively and efficiently must anticipate the need and expect to produce many of their own visual aids designed for their particular problem. Numerous examples of teacher constructed aids, including lists of materials needed, and specific directions for the construction and use of these materials, are presented by the writers.

The Eighteenth Yearbook of National Council of Teachers of Mathematics² includes numerous references to teacher constructed audio-visual aids. The use of materials such as cardboard, sticks, string, pictures, posters, plastic, blackboard drawing equipment, colored chalk, and crayons is discussed. Special attention is given to the construction of aids for teaching plane and solid geometry and geographical representation of complex roots, the preparation and use of homemade instruments for indirect measurement, and the development of models and other teaching aids for general mathematics.

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1. Weaver, Gilbert George, and Bollinger, Elroy W., Visual Aids, Their Construction and Use. (New York, 1949), 61-178, passim.
 2. National Council of Teachers of Mathematics, Multi-Sensory Aids in the Teaching of Mathematics. Eighteenth Yearbook, (New York, 1945), 3-387, passim.

A research study on the value of still pictures in the teaching of fourth grade history by Mehnert¹ utilized materials compiled by teachers and pupils. The writer concluded that still pictures are valuable in the presentation of historical subject-matter to the fourth grade children when they are used to assist either oral or silent-reading instruction.

Smith² has described the preparation and use of photographs by the classroom teacher. A variety of practical applications to classroom teaching situations are suggested. The writer indicates that the production of this type of material provides the teacher with a number of opportunities to obtain visual materials. He asserts, "Teachers are prone to think of visual materials as something-to-be-sent-away-for. They shrink from the annoyance of obtaining them. But, for the most part, they are overlooking the possibility of producing photographic prints and slides tailored to their own specifications and needs."

Power³ writes about the production by teachers and pupils of

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1. Mehnert, Martha C., "The Value of Still Pictures in the Teaching of Fourth Grade History," Unpublished Masters Thesis, The University of Chicago, (Chicago, Illinois, 1930), 37.
 2. Smith, Robert Archer, "Taking Pictures to Teach," Educational Screen, 28:250-51, June, 1949.
 3. Power, Brother R. B., "Leaf Prints and Pupil Interest," See and Hear, 2:28-29, April, 1947.

leaf prints for use as a method of demonstrating to pupils of biology or of general science, the different venations found in various types of leaves and grasses. Leaf prints are made by placing a pressed leaf on sensitized photographic paper and exposing the leaf and paper to light. The paper is processed in regular photographic developing solutions.

Taylor¹ suggests that opaque projection materials may be used with any curriculum and he claims the following advantages for this type of visual aid:

1. Materials made by both teacher and pupil can be used. These may be filed away for future use, relieving the teacher of unnecessary work.
2. Use of still pictures allows ample time for discussions of any projected material so that every advantage can be taken of the motivation provided.
3. The teacher has an almost unlimited range of pictures and other matter from which to choose.
4. A common experience is afforded the group to supplement the individual study of each pupil.
5. Both the device and the materials for use with it are inexpensive.

Dubats² discusses the use of teacher constructed materials in the opaque projector for teaching shorthand. He states that any teacher, as he progresses through the beginning steps in the study of shorthand, can quickly and simply type projection plates by limiting the copy

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1. Taylor, J. Y., Opaque Projection. (New York, 1941), 4.
 2. Dubats, William C., "Commercial Subject Teaching With the Opaque Projector," See and Hear, 13:36-37, Oct., 1947.

area to a six-inch square or the capacity of the opaque projector.

Givler¹ relates how a science teacher employing the opaque projector utilizes pictures from current magazines. The value of projecting flat picture material to supply common visual experiences for the entire class is emphasized. The writer suggests several techniques that teachers can use to prepare flat picture material for opaque projection, and concludes, "We have gone far enough, however, in collecting, mounting, classifying, and in the projection of the kinds of pictures described, to know that nearly all are good, and, if displayed to students at opportune times, will go far in helping to clarify a subject and give it vital interest."

Several writers have indicated that various types of teacher produced slides may make valuable contributions to learning. Jardine² describes a study of comparative methods of teaching reading. One method used the pre-primer and primer as basic texts with the addition of any supplementary materials they might need, exclusive of visual aids. The other method utilized teacher made slides to present the reading material. The purpose of the experiment was to determine whether two groups of children each beginning to read, one group taught by the formal method and the other taught by a so-called visual

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1. Givler, John Paul, "An Undeveloped Mine of Materials for Visual Education," Educational Screen, 19:53-54, Feb., 1944.
 2. Jardine, Alex, "The Experimental Use of Visual Aids in Teaching Beginning Reading," Educational Screen, 17:220-22, Sept., 1938.

method would show any appreciable difference in achievement at the end of one semester. The investigator concludes:

This experiment in reading with visual aids suggests that considerable improvement may be expected when this method replaces the more formal procedure. It indicates that the greatest improvement may be made with the slower children. It involves a great amount of work on the part of the teacher but permits an adaptation of reading matter on the child's level to the work of the classroom and is not restricted to the formal stereotyped matter found in the usual text.

Myers¹ claims that more effective use of blackboards may be obtained by utilizing the negative type slide. Directions for the construction and use of these aids by the teacher are presented. It is recommended that contact prints be made on sensitized lantern slide plates. The processed slides can be projected on the blackboard.

A survey of experiences with two-by-two inch slides in agricultural extension work in Pennsylvania is reported by Johnson² who concludes:

The two-by-two slide has influenced our visual education effort in the following directions: It has given impetus to the production of visual aids locally because this type of slide is relatively inexpensive and easily made when original subject matter is readily available; it has popularized visual aids of the lantern slide type because it takes full advantage of natural color photography.

The construction of a large classroom globe by pupils is

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1. Myers, Edward T., "The Negative Type Slide," See and Hear, 2:36-37, March, 1947.
 2. Johnson, George F., "New Horizons in Visual Aids," Educational Screen, 19:325-26, Oct., 1940.

mentioned by Sternig.¹ Wood and wire were used to form the framework for the globe, and paper mache was used to form the surface features. In addition to the production of a valuable classroom aid, the construction activities were regarded as being important for helping the pupils gain a more meaningful concept of the world as a globe.

Emmert² says, "Recent experiences in supervising elementary science, as well as conducting a course in descriptive astronomy, have brought forcefully to my mind the necessity of making and using simple mechanical aids to assist the pupils in gaining correct understandings of some of the many abstract concepts encountered in courses which deal with terrestrial and celestial relationships." The Coelosphere, Inverse Square Model, Comparative Size Model and the Altitude-Latitude Calculator are recommended as teacher-pupil constructed audio-visual aids for teaching astronomy, geography and mathematics.

The need for including experiences in the production of audio-visual materials as a part of the pre-service training for teachers, has been recognized by some writers. Gemung³ comments on the laboratory approach to pre-service training of teachers in the use of

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1. Sternig, John, "We Make Our Own World," See and Hear, 2:34-35, Nov., 1946.
 2. Emmert, Wilber, "Models for Enrichment," Educational Screen, 19:166-68, April, 1940.
 3. Gemung, Harriet, "A Laboratory in Visual Education," Educational Screen, 19:15, Jan., 1940.

audio-visual aids and says, "There has developed in the laboratory an exchange of ideas, not only in the techniques of using visual aids, but in the production of visual aids. Surprising accomplishments have been achieved in districts where no visual education distributing centers have been provided, but where teachers, realizing the need for such, have resorted to building their own visual aids libraries."

Chapter III

PROCEDURE AND ORGANIZATION OF DATA

To obtain the data for this study, questionnaires were sent to four hundred and thirty-one audio-visual coordinators in the United States and the Territory of Hawaii. The coordinators were asked for answers to the following questions:

I. What are two of the most valuable teacher constructed audio-visual aids utilized in the classroom of your schools?

II. Are illustrations or examples of these aids available?

III. What tools and supplies are necessary for the production of the above audio-visual aids?

IV. What special equipment is needed to utilize these audio-visual aids in the classroom?

Audio-visual coordinators were selected as cooperators in this study because the term teacher constructed audio-visual aids is not a part of the common vocabulary of educational personnel. It was assumed that specialists in the audio-visual field have a broader background for interpreting the above concept and therefore would be more likely to return the desired data. Audio-visual coordinators frequently work with large numbers of teachers and have at their disposal a variety of experiences with teacher constructed audio-visual aids from which to select the two most valuable asked for in the questionnaire.

One hundred and eighty-four of the one hundred and ninety-two questionnaires were returned with acceptable data.

The data have been classified into three major sections. The first section includes Table I which lists all of the suggested teacher constructed audio-visual aids and the frequency with which they were reported. This section also includes Table II which gives the general classifications of teacher constructed audio-visual aids and the frequency for each classification. The second section is concerned with the materials needed for the construction of the aids included in the general classifications listed in Table II. The data listed in Group A of this section were obtained from the returned questionnaires. The data included in Group B of this section were obtained from indicated reference sources. Tables III to XVI are included in this section. The third section of the data contains the suggestions of the special equipment needed to utilize the teacher constructed audio-visual aids, as reported by the cooperating audio-visual coordinators. Table XVII presents this data.

Table I presents the various desirable teacher constructed audio-visual aids and their frequency as suggested by the coordinators.

TABLE I

Suggested Teacher Constructed Audio-Visual Aids

	<u>Frequency</u>
Hand made lantern slides	67
2" x 2" slides	51
Charts	33
Models	33
35mm. filmstrips	20
Flat picture collections	18
Exhibits	16
Bulletin boards	13
Maps	13
Models for mathematic classes	10
Mounted material for opaque projector	10
Models for science classes	9
Picture strips for opaque projector	9
Recordings (general)	8
Friezes and murals	7
Posters	7
16mm. films	6
Mock-ups	6
Photographs	6
Flannel board	5
Tape recordings	5
Wire recordings	5
Dioramas	4
Graphs	4
Model projects such as Indian villages, farms post office, etc.	3
Materials enlarged by using the opaque projector	3
Blackboard diagrams	3
Drawings for the opaque projector	3
Roller movie box	3
Bulletins and pamphlets	3
Disc recordings	2
Relief maps	2

TABLE I (continued)

Suggested Teacher Constructed Audio-Visual Aids

	<u>Frequency</u>
Silhouette designs	2
Fraction boards	2
Portable bulletin boards	2
Electric maps	2
Experience charts	2
Electronics experiment apparatus	2
Puppets and marionettes	1
Electric arithmetic drill board	1
Combination of 16mm. movies (silent) and tape recorded narration	1
Museum material	1
Number thermometer	1
Flipboard easel with accompanying diagrams and charts	1
Arithmetic counting aids	1
Sand tables	1
Material for Vu-Graph overhead projector	1
Blackboard (general)	1
Picture maps made on white window shades	1
Outline maps	1
Flannel graph	1
Copying stand	1
Panoramas	1
Mimeographed teaching aids (charts, maps, outline drawings)	1
Asbestos relief maps	1
Blackboard maps	1
Number combination charts	1
Three dimensional bulletin boards	1
Giant picture book for reading readiness	1
Display boards	1
Number wheels	1
Lighted typing drill board	1
Terraria	1
Crepe paper balls	1
Opaque projection materials	1
Workboard	1
Picture enlargements by opaque projection	1
Combination of tape recordings and photographs of class activity	1

The suggested teacher constructed audio-visual aids have been classified into general types for the convenience of the reader. These classifications are listed in Table II.

TABLE II

General Types of Suggested Teacher Constructed Audio-Visual Aids

	<u>Frequency</u>
Hand made lantern slides	67
Models and Mock-ups	61
2" x 2" slides	51
Charts and posters	47
Flat pictures	24
Mounted material for the opaque projector	23
Bulletin boards	21
35mm. filmstrips	20
Recordings	20
Maps	19
Exhibits	17
Friezes and murals	7
Flannel board	7
Chalkboard	5

The data relating to materials recommended for construction of the suggested teacher constructed audio-visual aids were obtained from two sources. The questionnaires returned by cooperating audio-visual coordinators included suggestions of needed materials and these are included in Group A of Tables III to XVI inclusive. The investigator did not consider the data obtained by this method to provide adequate information regarding materials needed for the construction of teacher constructed audio-visual aids. To supplement the data obtained by means of the questionnaire, the writer reviewed the works of outstanding authors in this field and obtained additional data on materials needed for the construction of these aids. These data are cited in Group B of Tables III to XVI inclusive.

TABLE III

Materials Suggested for Constructing Hand Made Lantern Slides

Group A: Suggested in the returned questionnaires

3 $\frac{1}{4}$ " x 4" plain lantern slide glass
 3 $\frac{1}{4}$ " x 4" etched lantern slide glass
 3 $\frac{1}{4}$ " x 4" etched plastic slide material
 Lantern slide crayons (assorted colors)
 Lantern slide ink (assorted colors)
 Lantern slide ink solvent
 Medium soft lead pencil
 Hard lead pencil
 Amber colored lantern slide cellophane
 Red lantern slide carbon paper
 Lantern slide binding tape
 Cardboard holder for making lantern slides
 Cooking or photographic gelatine
 Ruler with raised edge
 Ruling pen
 Translucent paper
 Fine pointed pen
 Water color brushes (size oo)
 India ink
 Opaque paper for silhouette work
 Copying stand lighted from below
 Wax pencils

Group B: Suggested by the indicated reference sources

Hamilton¹ suggests the ball point pen for applying lantern slide ink and the use of sheets of colored cellophane for adding color to hand made lantern slides.

Haas and Packer² also suggest the use of Lumarith celluloid for the construction of hand made lantern slides.

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1. Hamilton, G. E., How to Make Hand Made Lantern Slides. (Meadville, Pennsylvania, 1939), 24.
 2. Haas, Kenneth B., and Packer, Harry Q., Preparation and Use of Visual Aids. (New York, 1946), 45.

TABLE IV

Materials Suggested for Constructing Mock-ups and Models

Group A: Suggested in the returned questionnaires

Plexiglass, cellophane
 Plastic cement
 Cardboard and tagboard
 Construction paper
 Rubber cement
 Modeling clay, plaster of paris
 Cloth, burlap, string, cotton
 Sheet metal, heavy meshed wire
 Copper wire
 Plywood
 Soft wood lumber
 Nails, pins, tacks, knitting needles
 Glass, glass tubing
 Masking tape, Scotch tape, adhesive tape

Group B: Suggested by the indicated reference sources

Several compounds for molding materials were suggested in the questionnaire data. The suggestions, however, did not delineate the basic contents of these compounds. Examples of formulas for preparing molding compounds similar to the compounds suggested in the questionnaire data are cited below from the United States Office of Education Bulletin, Navexos P-296.¹

No. 1

1 pint sawdust (ordinary)
 1 pint plaster
 $\frac{1}{4}$ pint school library paste
 Dissolve paste in water just enough to thin.
 Add plaster. Add sawdust; knead until the consistency of tough dough.
 Test: Texture very good.
 Setting time: 15 minutes (a little too fast for large areas).

1. United States Office of Education, How to Build Terrain Models, Bulletin, Navexos P-296, (Washington, D. C., 1945), 20-21.

TABLE IV (continued)

Materials Suggested for Constructing Mock-ups and ModelsNo. 2

1 pint sawdust
 3/4 pint plaster
 1/2 pint school library paste
 3 drops LePage's glue
 Dissolve paste in water, mix this slightly.
 Add glue; add plaster; add sawdust; knead
 to consistency of tough dough.
 Test: Setting time: 8 hours.

No. 3

2 pints newspaper (wet)
 1 pint plaster
 1/4 teaspoon LePage's glue
 1/2 pint water
 Soak newspaper (torn in small pieces) over-
 night. Rub wet paper between palms
 until ground to pulp. Add glue to
 water; add plaster; add newspaper pulp;
 knead until consistency of heavy dough.
 Test: Setting time: 3 hours.

No. 4

2 pints newspaper pulp (wet)
 2 pints plaster
 1/4 teaspoon LePage's glue
 1/2 pint water
 Same procedure as No. 3.
 Test: Setting time: 1/2 hour.

No. 5

1/2 pint newspaper pulp (wet)
 1/2 pint dry clay, powdered (sifted through
 ordinary window screening)
 1 teaspoon LePage's glue
 Add dry clay to glue water solution; add
 paper pulp and knead to consistency
 of dough.
 Test: Setting time: 12 hours.

TABLE V

Materials Suggested for the Production of 2" x 2" Slides

Group A: Suggested in the returned questionnaires

35mm. positive color film, daylight type
 35mm. positive color film, tungsten type
 35mm. direct positive black and white film
 35mm. camera with lens in a focusing mount and with
 a copy attachment. Cameras suggested are
 Argus C-3, Leica, Exacta and Eastman Reflex.
 Camera tripod
 Copying stand with lights
 Flash attachments for the 35mm. camera
 Photo-electric exposure meter
 Masking tape and paper labels
 Ruler or measuring tape
 2" x 2" slide mounts

Group B: Suggested by the indicated reference sources

Goetting¹ lists additional materials needed if the
 processing of black and white film is to be under-
 taken by the teacher:

Developing solutions
 Developing pans
 Contact printer
 Thermometer
 Scissors
 Negative film
 35mm. positive film, two dozen pieces, two
 inches long. (These must be kept in
 light tight container).
 Masks
 Cover glasses
 Binding tape.

1. Goetting, M. L., Laboratory Manual and Workbook in Visual Education, (Waco, Texas, 1944), 112.

TABLE VI

Materials Suggested for Constructing Charts and Posters

Group A: Suggested in the returned questionnaires

Pastel crayons
 Colored construction paper
 Scissors
 Rubber cement
 Protractors
 Ruler
 Lettering stencils
 Multi-colored drawing pencils
 Newsprint
 Silk screen equipment and materials
 Brush pen, flow pen, lettering pen
 India ink
 Kalsomine
 Water color brush
 Tag board

Group B: Suggested by the indicated reference sources

In their chapter on Designed Materials, Heiss, Osborn and Hoffman,¹ suggest the following equipment for the construction of charts, posters and graphs:

Wrapping paper for rough or temporary use
 Bristol board, 22" x 26", in all colors
 Muslin or sign painters cloth
 Ball-pointed or spoon-bill pens
 Paint brushes, size numbers 5, 7, and 11, for all colors
 Rubber stamps (one inch) for lettering or figures
 Drawing instruments, small size
 Showcard paints, crayons and chalk of all colors.
 Stencils for frequently reproduced items.

1. Heiss, Elwood D., Osborn, Ellsworth O., and Hoffman, C. Wesley, Modern Methods and Materials for Teaching Science. (New York, 1940), 212.

TABLE VI (continued)

Materials Suggested for Constructing Charts and Posters

Emmert¹ recommends the use of lettering templates such as Wrico, Normograph and Leroy, for producing accurate lettering on charts, posters and graphs.

Weaver and Bollinger² mention the following additional materials for use in constructing charts.

Paper board, solid
 News board, pasted
 News board, lined
 Poster board
 Tag board
 Showcard and display board
 Mat board
 Stencil board (oiled)
 Bristols
 Blanks
 Railroad board
 Sign cloth
 Sign painter's oil cloth
 Roll window shades
 Wall boards
 Flexible ruler
 French curve
 Proportional dividers
 Pantograph
 Opaque projector for making enlargements
 Inking pen
 Striping tools
 Hallcraft display letters
 Redikut letters
 Gummed-paper letters and figures
 Laquers and enamels
 Casein colors
 Aniline dyes

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1. Emmert, Bryan, "Inexpensive Lettering Aids for Teachers," Educational Screen, 18:94-97, March, 1939.
 2. Weaver, Gilbert George, and Bollinger, Elroy W., op. cit., 118-78.

TABLE VII

Materials Suggested for Preparing Flat Picture Material

Group A: Suggested in the returned questionnaires

Filing case for flat pictures

Filing dividers

Labels

Dry mounting tissue

Mounting press

Rubber cement

Tag board

Materials suggested for producing flat pictures
photographically:Press type camera and accessories includ-
ing flash gun and film

Direct positive paper

Lighting equipment

Copying board

Tripod and equipment

Photoflood lights

Chemicals for processing

Group B: Suggested by the indicated reference sources

Dent¹ mentions the use of cellophane to cover
mounted flat pictures for protection against finger
marks and dirt.Haas and Packer² suggest mounting flat pictures on
colored construction paper.

1. Dent, Ellsworth C., The Audio-Visual Handbook. (Chicago, 1939),
37-38.

2. Haas, Kenneth B., and Packer, Harry Q., op. cit., 45.

TABLE VIII

Materials Suggested for Preparing Mounted Materials for the Opaque
Projector

Group A: Suggested in the returned questionnaires

Pictures from magazines, books, and bulletins
Shelf paper
Card board
Aluminum slip guide for the opaque projector
Rubber cement
Scissors
Ruler
Masking tape and Scotch tape
Rubber bands for holding book pages in place while
projecting.

TABLE IX

 Materials Suggested for Preparing Bulletin Boards

Group A: Suggested in the returned questionnaires

Best-Test paper cement
 Colored construction paper
 Tag board, Bristol board
 Colored tacks
 Exacto knife set
 Scissors
 Flex-O-Wax
 Celotex board, cork board
 Redikut paper letters

Group B: Suggested by the indicated reference sources

Kinney and Dresden¹ mention the following materials for preparing the display area:

Padded canvas
 Monks cloth or Indian Head cloth
 Wall board, green label board or beaver board
 Wood blocks covered with wall board, Celotex

They also suggest the following for displaying current materials:

Steel pins, T. pins
 Claw hammer, pin hammer
 Assorted nails and brads, thumbtacks
 String, wire, cloth
 Wall hooks, pliers, scissors, cutting knife
 Library paste, glue paste, rubber cement

Bruce² indicates that burlap makes a satisfactory covering for the bulletin board and that a "Stapler with a release, which permits the base to swing out of normal position, can be used to attach materials to the board."

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1. Kinney, Lucien and Dresden, Katharine, Better Learning Through Current Materials. (Palo Alto, 1949), 107-130.
 2. Bruce, Mary, "Better Bulletinboards" National Educational Association Journal, 38:603, Nov., 1949.

TABLE X

Materials Suggested for the Production of 35mm. Filmstrips

Group A: Suggested in the returned questionnaires

35mm. positive color film, daylight type
 35mm. positive color film, tungsten type
 35mm. direct positive black and white film
 35mm. camera with lens in a focusing mount and with
 a copy attachment. Cameras suggested are the
 Argus C-3, Leica, Exacta and Eastman Reflex.
 Camera tripod
 Copying stand with lights
 Flash attachments for the 35mm. camera
 Photo-electric exposure meter
 Masking tape and paper
 Ruler or measuring tape

Group B: Suggested by the indicated reference sources

Goetting¹ suggests the need for developing materials
 and equipment, and a film strip printer if the
 strip is to be processed by the teacher.

1. Goetting, M. L., op. cit., 135.

TABLE XI

Materials Suggested for the Production of Recordings

Group A: Suggested in the returned questionnaires

Wire recorder and recording wire
Tape recorder and recording tape
Scotch tape
Empty 8mm. film reels for use in filing
recorded tape or wire
Disc recorder and recording disc
Labels
Radio
Scissors

TABLE XII

Materials Suggested for the Production of Maps

Group A: Suggested in the returned questionnaires

Salt, water and flour
 Cardboard
 Asbestos, water colors
 Wrapping paper
 Slide projector and opaque projector for enlarging maps
 Pantograph
 Plastic ruler
 Materials for constructing an electric map:
 Plywood
 Fine copper wire
 Two dry cell batteries
 Small flashlight bulbs and sockets

Group B: Suggested by the indicated reference sources

Moore, Embry and Benson¹ indicate that the following materials are needed for the preparation of relief maps of the local community:

1. Tracing paper
2. Local map, secured from the county courthouse. A map of this type is available for all sections of the United States.
3. Carbon paper
4. 1 beaver board, $\frac{1}{4}$ inch thick, usually about 2' x 2' in area.
5. 1 quart or less of library paste
6. Wood pulp
7. Scissors, foot rule, pencil, etc.
8. 1 small can shellac
9. 1 bristle brush, $\frac{1}{2}$ inch wide
10. Mixing dishes
11. 1 pound plaster of paris
12. 6 sheets corrugated cardboard, 2' x 2', $\frac{1}{8}$ inch or more in thickness

1. Moore, Lyell J., Embry, Henry W., and Benson, Esther M., op. cit., 38.

TABLE XII (continued)

Materials Suggested for the Production of Maps

13. Small amounts of 'map' oil paint in colors: brown, blue, green, yellow, etc. These colors should coincide with the colors used on commercially made, physical-feature maps, since the object of this terrain map is to correlate the regular symbols and color values used on the commercially produced maps with the terrain model study.

TABLE XIII

Materials Suggested for the Production of Exhibits

Group A: Suggested in the returned questionnaires

Materials from museums, art collections, traveling picture collections, commercial advertising collections, and local collections

Group B: Suggested by the indicated reference sources

A Department of Agriculture bulletin¹ suggests that choice of materials for exhibits will depend on the subject to be presented, purpose, space allotted, audience, what material is easy to get, and funds. This same publication, however, includes the following materials among those suggested for use in preparing educational exhibits:

Photographs, posters, charts, maps and graphs
 Models, mock-ups and objects
 Motion pictures, slide films and slides projected automatically
 Changing indirect lights
 Wall board, plywood
 Plastic sheets, glass
 Imitation glass, moss, sawdust
 Sponges and steel wool
 Plaster of paris, paper mache
 Balsa wood and plastic wood
 Display letters

1. Gilbertson, H. W., Educational Exhibits: How to Prepare and Use Them. Bulletin No. 634. (Washington, D. C., 1948), 6-24, passim.

TABLE XIV

Materials Suggested for the Production of Friezes and Murals

Group A: Suggested in the returned questionnaires

Long strips of muslin
Manila paper or tag board
Paints, colored chalk, crayons
Scissors
Butcher paper
Poster paints
Thumb tacks and steel pins
Wire stapling equipment
Scotch tape and masking tape

TABLE XV

Materials Suggested for the Construction of Flannel Board Teaching
Aids

Group A: Suggested in the returned questionnaires

Outing flannel
Cardboard
Board to provide base for flannel covering
Glue or paste
Flannel to place back of instructional
materials
No. 2 sandpaper
Wire stapling equipment
Scissors
Exacto knife set
Ruler
Redikut cardboard letters, 3 inch size

TABLE XVI

Materials Suggested for the Production of Chalkboard Teaching Aids

Group A: Suggested in the returned questionnaires

Chalkboard compass
Chalkboard pointer
Chalkboard triangle, protractor and ruler
Colored chalk
Combination sponge rubber and chamois skin eraser
Music scale liner
Butcher paper for pounce patterns
Tracing wheel and tale bag for making pounce patterns
Slide projection and opaque projection equipment for projecting patterns in constructing chalkboard drawings

TABLE XVII

Equipment Needed for Utilizing the Suggested Teacher Constructed
Audio-Visual Aids

	<u>Equipment Needed</u>
3¼" x 4" Lantern Slides	3¼" x 4" slide projector Overhead projector Projection screen
2" x 2" Slides	2" x 2" slide projector Projection screen
Models and Mock-ups	Display tables Demonstration tables Wall display area
Posters and Charts	Bulletin boards Map rail with chart clips
Flat Pictures	Bulletin boards Display tables
Mounted Material for the Opaque Projector	Opaque projector Card holders for opaque projector Projection screen
Bulletin Board Material	Bulletin Board (fixed or movable)
35mm. Filmstrips	35mm. filmstrip projector Projection screen
Recordings	Playback equipment (tape, wire and disc)
Maps	Wall display area Map rail Map pointer
Exhibits	Movable tables Movable bulletin boards
Friezes and Murals	Wall display area

TABLE XVII (continued)

Equipment Needed for Utilizing the Suggested Teacher Constructed
Audio-Visual Aids

	<u>Equipment Needed</u>
Flannel Board	Display area
Chalkboard	Chalkboard Chalkboard pointer

A total of sixteen different kinds of equipment were suggested as being needed for utilizing the teacher constructed audio-visual aids mentioned in Table II.

Chapter IV

SUMMARY AND CONCLUSIONS

Purpose and Procedure

The purpose of this study was to discover which teacher constructed audio-visual aids are considered to be valuable for classroom use, and which materials and equipment are needed for the construction and the utilization of these aids. To obtain the data for this study, the investigator solicited information about teacher constructed audio-visual aids from audio-visual coordinators located in thirty-four states of the United States and the Territory of Hawaii. Four hundred and thirty-one questionnaires were sent to the coordinators. The questionnaires requested responses to the following questions:

I. What are two of the most valuable teacher constructed audio-visual aids utilized in the classrooms of your schools?

II. Are illustrations or examples of these aids available?

III. What tools and supplies are necessary for the construction of the above audio-visual aids?

IV. What special equipment is needed to utilize these audio-visual aids in the classroom?

Audio-visual coordinators were selected to cooperate in this study because it was assumed that specialists in the audio-visual area have a broader background of experience and information for

interpreting the questions included in the questionnaires; likewise, it was assumed they would be more likely to supply acceptable data.

A summary of the data gathered is presented in tabular form in the following tables:

A. Table Number I: Suggested Teacher Constructed Audio-Visual Aids. This table lists the sixty-eight recommended teacher constructed audio-visual aids which are mentioned with a frequency of four hundred and twenty-nine times.

B. Table Number II: General Types of Suggested Teacher Constructed Audio-Visual Aids. This table classifies the recommended teacher constructed audio-visual aids into fourteen general types. The frequencies mentioned for these classifications were three hundred and eighty-nine, which is 90% of the total number of responses.

C. The different types of materials and equipment needed to produce the teacher constructed audio-visual aids mentioned in Tables I and II are listed in the following tables:

Table III: Materials Suggested for Constructing Hand Made Lantern Slides

Table IV: Materials Suggested for Constructing Mock-ups and Models

Table V: Materials Suggested for the Production of 2" x 2" Slides

Table VI: Materials Suggested for Constructing Charts and Posters

Table VII: Materials Suggested for Preparing Flat Picture Material

Table VIII: Materials Suggested for Preparing Mounted Materials for the Opaque Projector

Table IX: Materials Suggested for Preparing Bulletin Boards

Table X: Materials Suggested for the Production of 35mm. Filmstrips

Table XI: Materials Suggested for the Production of Recordings

Table XII: Materials Suggested for the Production of Maps

Table XIII: Materials Suggested for the Production of Exhibits

Table XIV: Materials Suggested for the Production of Friezes and Murals

Table XV: Materials Suggested for the Production of Flannel Board Teaching Aids

Table XVI: Materials Suggested for the Construction of Chalkboard Teaching Aids.

The data in the above sixteen tables were obtained from two sources; namely, the returned questionnaires and various selected references. The investigator considered that the data obtained from the questionnaires provided inadequate information regarding materials needed for the production of teacher constructed audio-visual aids. To supplement the data obtained from the questionnaires, additional data were secured from selected references.

D. A summation table is provided to summarize the quantity of materials and equipment listed in Tables III through XVI.

TABLE XVIII

Number of Materials and Equipment Suggested for the Production of the Indicated Teacher Constructed Audio-Visual Aids

<u>Table No.</u>	<u>Suggested by data from the questionnaires</u>	<u>Suggested by data from the selected references</u>
III. Materials Suggested for Constructing Hand Made Lantern Slides	22	3
IV. Materials Suggested for Constructing Mock-ups and Models	14	5
V. Materials Suggested for the Production of 2" x 2" Slides	11	10
VI. Materials Suggested for Constructing Charts and Posters	15	40
VII. Materials Suggested for Preparing Flat Picture Material	14	2
VIII. Materials Suggested for Preparing Mounted Material for the Opaque Projector	9	—
IX. Materials Suggested for Preparing Bulletin Boards	9	12
X. Materials Suggested for the Production of 35mm. Filmstrips	10	3

TABLE XVII (continued)

Number of Materials and Equipment Suggested for the Production of the
Indicated Teacher Constructed Audio-Visual Aids

XI. Materials Suggested for the Production of Recordings	8	—
XII. Materials Suggested for the Production of Maps	11	13
XIII. Materials Suggested for the Production of Exhibits	5	11
XIV. Materials Suggested for the Production of Friezes and Murals	9	—
XV. Materials Suggested for the Construction of Flannel Board Teaching Aids	11	—
XVI. Materials Suggested for the Production of Chalk- board Teaching Aids	10	—

E. Table Number XVII: Equipment Needed for Utilizing the Suggested Teacher Constructed Audio-Visual Aids. This table lists the special equipment recommended for utilizing the teacher constructed audio-visual aids mentioned in Tables I and II. These materials and equipment are: 3½" x 4" slide projector, overhead projector, projection screen, 2" x 2" slide projector, display tables, demonstration tables, wall display area, bulletin boards, map rail with chart clips, opaque projector with card holders, 35mm. filmstrip projector, playback equipment, map pointer, chalkboard and chalkboard pointer.

Conclusions

The conclusions formed from the interpretation of the data gathered are:

I. Numerous teacher constructed audio-visual aids are valuable materials for improving instruction. Some of the experiences supplied by this type of teaching material are not readily available from commercially produced audio-visual aids.

II. Some of the exceedingly valuable teacher constructed audio-visual aids include: hand made lantern slides, models and mock-ups, two by two inch slides, charts and posters, flat pictures, mounted materials for the opaque projector, bulletin boards, 35mm. filmstrips, recordings, maps, exhibits, friezes and murals, flannel boards and chalkboard materials.

III. An extensive variety of teacher constructed aids, in addition to those aids frequently reported in this study, are also valuable. These aids, designed to meet special needs for audio-visual experiences, were not as frequently reported as those teaching aids with general applicability.

IV. Teacher constructed audio-visual aids can frequently be constructed with small amounts of inexpensive equipment and materials.

V. A minimum of special materials and equipment is needed to utilize teacher constructed audio-visual aids.

Limitations

I. Since the concept 'teacher constructed audio-visual aid' is not common pedagogical vernacular, many aids which might have been included in this category may have been overlooked by some coordinators.

II. The determination of the two most valuable aids was subjective and was not based upon any common rating scale.

III. The data were collected during the summer months when some audio-visual coordinators were not in immediate contact with teaching personnel. This may have limited the objectivity of the evaluation of the teacher constructed aids reported.

Educational Implications and Recommendations

Materials, equipment, and facilities for the production and utilization of teacher constructed audio-visual aids should be made available by school districts for the classroom teacher. Rufsvold, in the American Library Association publication, Audio-Visual School Library Service, points out that the library workroom should provide facilities for the production, by the teacher and the pupils, of many audio-visual aids. Modern school plant planning includes specific recommendations that audio-visual aids be incorporated in the library as well as other instructional materials.

The persons responsible for the administration of the organization and co-ordination of the school audio-visual program, should

encourage the development and use of locally prepared audio-visual materials.

The results of this study indicate that more emphasis should be given to providing teachers with experiences in constructing audio-visual aids. The preceding statement is corroborated by the findings of De Kieffer in his study of "The Status of Teacher Training in Audio-Visual Education." He revealed that only about fifty-per cent of the introductory audio-visual courses included topics or units on teacher preparation of audio-visual aids.

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Jardine, Alex. "The Experimental Use of Visual Aids in Teaching Beginning Reading," Educational Screen 17:220-22 (Sept., 1938)

Johnson, George F. "New Horizons in Visual Aids," Educational Screen 19:325-26 (Oct., 1940)

- Kinder, James S. "Research in Audio-Visual Education," Educational Screen 18:360-61 (Dec., 1939)
- McCafferty, R. "Developing Visual Materials for Classroom Use," National Education Association Journal 35:521-22 (Nov., 1946)
- March, L. S. "Homespun Tools of Learning," School Executive 63:18-20 (Aug., 1944)
- Moore, Lyell J., Embry, Henry W., and Benson, Esther M. "Mapping the Local Community," See and Hear 2:38 (May, 1947)
- Myers, Edward T. "The Negative Type Slide," See and Hear 2:36-37 (March, 1947)
- Power, Brother R. B. "Leaf Prints and Pupil Interest," See and Hear 2:28-29 (April, 1947)
- Smith, Robert Archer. "Taking Pictures to Teach," Educational Screen 28:250-51 (June, 1949)
- Smith, T. E. "Class-made Visual Aids With Sound Effects," Social Studies 33:175-76
- Sternig, John. "We Make Our Own World," See and Hear 2:34-35 (Nov., 1946)
- Vauter, Sibyl. "Varied Uses of Slides in Intermediate Grades," Educational Screen 21:178-79 (May, 1942)
- Zehr, W. M. "Classroom Built Visual Aids," Scholastic 47:51 (Jan., 14, 1946)

Unpublished Works

- DeKieffer, Robert E. "The Status of Teacher Training in Audio-Visual Education in the Forty-Eight States," Unpublished doctor's dissertation, Iowa City, Iowa: State University of Iowa, 1948
- Grant, Robert James. "The Teaching of Visualization," Unpublished master's thesis, Iowa City, Iowa: State University of Iowa, 1931

Mehnert, Martha C. "The Value of Still Pictures in Teaching of Fourth Grade History," Unpublished master's thesis, Chicago, Illinois: The University of Chicago, 1930

TABLE OF APPENDICES

- Appendix A:** Questionnaire, Related Correspondence and
Distribution Map.
- Appendix B:** Complete List of Persons Submitting Data.
- Appendix C:** Comments by Persons Submitting Data.
- Appendix D:** Illustrations of Some Teacher Constructed
Audio-Visual Aids.

APPENDIX A

In Appendix A the reader will find a sample of the questionnaire, letter of introduction to the questionnaire, and the card sent to coordinators who were late in returning their questionnaires. A distribution map indicating the location and number of the audio-visual coordinators who returned questionnaires with acceptable data, is also included in Appendix A.

INT U.S. OFFICE OF EDUCATION AND U.S. NAVY RESEARCH PROJECT



WHAT ARE TWO OF THE MOST VALUABLE TEACHER CONSTRUCTED AUDIO-VISUAL AIDS UTILIZED IN THE CLASSROOMS OF YOUR SCHOOLS?

No. 1 _____

No. 2 _____

ARE ILLUSTRATIONS OR EXAMPLES OF THESE AIDS AVAILABLE?

No. 1 _____ No. 2 _____

WHAT TOOLS AND SUPPLIES ARE NECESSARY FOR THE PRODUCTION OF THE ABOVE AUDIO-VISUAL AIDS?

No. 1 _____

No. 2 _____

WHAT SPECIAL EQUIPMENT IS NEEDED TO UTILIZE THESE AUDIO-VISUAL AIDS IN THE CLASSROOM?

No. 1 _____

No. 2 _____



THANK YOU!

And Please return to the following address by July 11, 1949

NAME _____

POSITION _____

SCHOOL SYSTEM _____

DATE _____ 1949

OFFICE OF VISUAL EDUCATION
CENTRAL WASHINGTON COLLEGE
ELLENSBURG, WASHINGTON

CENTRAL WASHINGTON COLLEGE OF EDUCATION
ELLENSBURG, WASHINGTON

OFFICE OF VISUAL EDUCATION

Dear Co-worker:

A cooperative project between the U.S. Office of Education and the U.S. Navy is being carried on through the Office of Visual Education at Central Washington College. The purpose of the project is to discover those teaching aids other than motion pictures, helpful to instructors and students in the classroom.

The results of this investigation will be utilized in the preparation, on a non-profit basis, of an instructors manual. The purpose of this manual will be to encourage instructors to develop their own audio-visual aids to training and to give practical advice and illustrated examples on how this may be accomplished.

To obtain the necessary information concerning these teacher constructed audio-visual aids, we are eliciting the assistance of several audio-visual coordinators and administrators throughout the United States. We feel that specialists in the field who closely associated with the work of teachers in this area, can give us the help we need.

We would like to have you consider the questions on the attached page, and send your recommendations to this office by means of the enclosed envelope.

The manner in which the cooperating personnel on this project have been selected, has made it impossible to write you a more personal letter. Please accept our assurance, however, that the research agencies will sincerely appreciate your contributions.

Cordially,

MARVIN J. SCHROEDER, Research Assistant,
Joint U.S.O.E. and C.W.C.E. Research
Project

The following card was sent to the audio-visual coordinators who had not returned their questionnaires by July 11, 1949.

July 12, 1949

In checking our returns of the questionnaires recently mailed to some of the audio-visual coordinators in the United States, we find that yours has not been received. Perhaps the questionnaires and the explanatory letter were late in reaching your summer address, however, we want to re-emphasize the importance of your professional opinion on this matter.

May we again solicit your cooperation and ask that your suggestions be forwarded to us just as soon as possible.



Cordially,

MARVIN J. SCHROEDER, Research Asst.
Joint U.S.O.E. & C.W.C.E. Research Proj.

The geographic distribution of the audio-visual coordinators who participated in this study is indicated on the following map.



Territory of Hawaii

APPENDIX B

The names and addresses of the audio-visual coordinators who returned questionnaires with acceptable data are listed alphabetically by states in Appendix B.

Marvin Little, Coordinator of Audio-Visual Aids,
Troy City School, Troy, Alabama.

W. McK. Wright, Supervisor of Audio-Visual Instruction
Jefferson County Schools, Birmingham, Alabama.

Vincent E. Alexander, Director of Audio-Visual Aids,
Kings County Schools, 1614 North Green Street,
Handford, California.

Mr. Charles Betts, Alhambra City School District,
1000 South Granada, Alhambra, California.

Miss Elsie Chambers, Director of Visual Education,
1502 Palm Avenue, Huntington Beach, California.

Mr Raymond E. Denno, Coordinator of Audio-Visual Service
San Diego County Schools, 209 Civic Center, San Diego 1,
California.

Mrs. Margaret Divizia, Supervisor of Audio-Visual Aids,
Los Angeles City Schools, 1205 West Pico Boulevard,
Los Angeles 15, California.

Irma Doty, Director of Audio-Visual Education,
Colusa County Schools, Court House, Colusa, California.

Mrs. Fay Dyer, General Supervisor, Merced County Schools,
Office of County Superintendent of Schools,
Merced, California.

Mr. Walter Eagan, Director of Audio-Visual Education,
Healdsburg City Schools, Healdsburg, California.

Mr. O. L. Eckman, Director of Audio-Visual Education,
Monterey County Schools, 106 Lincoln Avenue,
Salinas, California.

Mr. John E. Fetz, Supervisor of Visual Aids,
Yolo County Schools, Court House, Woodland, California.

Mrs. Martha Foley, Supervisor of Audio-Visual Services,
San Joaquin County Schools, 338 East Market Street,
Stockton 6, California.

Mr. Harold Francis, Director of Visual Education,
Stanislaus County Schools, P. O. Box 1038, Modesto,
California.

Mr. Donald Newcomer, Burbank Unified School District,
245 East Magnolia Avenue, Burbank, California.

Mr. Charles F. Schwoerer, Superintendent of Calaveras County
Schools, San Andreas, California.

Mr. Elmer Stoll, Director of Audio-Visual Education,
Monterey Union High School, Monterey, California.

Mr. Paul Walters, Director of Audio-Visual Education,
Solano County Schools, Court House, Fairfield, California.

Kent Samborn, Superintendent of Schools,
Longmont, Colorado.

Howard Woolam, Director of Audio-Visual Education,
Boulder, Colorado.

Mr. C. Ray Bender, Director of Audio-Visual Education,
Sacramento County Schools, Room 301, Court House,
Sacramento, California.

Mr. Frank Cameron, Director of Audio-Visual Education,
Humboldt County Schools, Court House, Eureka, California.

Mr. DeForest Hamilton, Director of Audio-Visual Education,
Sonoma County Schools, Court House, Santa Rosa, California.

Mr. Leland Harriman, Director of Audio-Visual Education,
Gridley Schools, Wilson School, Gridley, California.

Mr. Gardner Hart, Director of Visual Education,
Oakland Public Schools, 1025 Second Avenue, Oakland 10,
California.

Mr. Harold F. Hughes, Director of Audio-Visual Education,
Fresno City Schools, 2348 Mariposa Street, Fresno, California.

Mr. Ray W. Johnson, Director of Audio-Visual Education,
Riverside County Schools, Riverside, California.

Mrs. Grace W. Jones, Librarian and Director of Audio-Visual Education. Santa Monica City Schools, 1333 Sixth Street, Santa Monica, California.

Miss Nina Jorstad, Supervisor of Audio-Visual Aids, 1514 K. Street, Bakersfield, California.

Mr. Paul Liebhart, Director of Audio-Visual Aids, Alameda Unified School District, Porter School, Alameda, California.

Mr. Robert D. Lovejoy, Audio-Visual Education Director, Pleasant Hill School, Concord, California.

Mr. Leon B. Marshall, Director of Audio-Visual Education, Glenn County Schools, Willows, California.

Mr. H. Barret Patton, Director of Audio-Visual Aids, Santa Clara County Schools, Hall of Records, San Jose, California.

Mr. Elmer H. Pelham, Director of Audio-Visual Education, Lake Mendocino County Schools, Court House, Ukiah, California.

Mr. Worthington Prince, Director of Audio-Visual Education, Grant Union High School and Technical College, Los Angeles 12, California.

Mrs. Genev Roberts, Director of Audio-Visual Education, Shasta County Schools, Box 189, Redding, California.

Mr. Lloyd Sweetman, Supervisor of Audio-Visual Aids, Sacramento City Unified School District, 1200-21st Street, Sacramento, California.

Mr. Lydon Vivrette, Director of Audio-Visual Aids, Berkely Unified School District, 1414 Walnut Street, Berkely, California.

Miss Mary Louise Zingheim, Director of Instructional Aids, San Jose Unified School District, San Jose 14, California.

Mrs. Helen Rachford, Director of Audio-Visual Education, Los Angeles County Schools, 808 North Spring Street, Los Angeles, 12 California.

Miss Doris Hein, Director of Visual Education,
Meriden Public Schools, Meriden, Connecticut.

Mr. George E. Ingham, Director of Audio-Visual Education,
Westport Public Schools, Westport, Connecticut.

Mr. Richard W. Morton, Director of Audio-Visual Education,
West Hartford Public Schools, West Hartford, Connecticut.

Mr. Leo Rosenthal, Director of Audio-Visual Education,
Fairfield Public Schools, Fairfield, Connecticut.

Mr. Royden Tripp, Director of Audio-Visual Education.
New Britain Public Schools, Center Junior High School,
New Britain, Connecticut.

Donovan B. Benzie, Director of Visual Education,
Lee County, Ft. Meyers, Florida.

Hazel W. Bush, Audio-Visual Chairman, Nyomina Park
Elementary School, Ocala, Florida.

Samuel Eff, Science Instructor, Ocala High School,
Ocala, Florida.

W. L. Goette, Science Instructor, P.K. Yonge Laboratory School,
College of Education, Gainesville, Florida.

Francis Hatfield, Supervisor of Instructional Materials,
Broward County, Ft. Lauderdale, Florida.

Reed Holt, Supervisor of Multi-Sensory Aids,
County of Polk, Bartow, Florida.

Nelle Still, Material Coordinator, Lyman Hall, Hall County,
Gainesville, Florida.

Mary Edward Mitchell, Instructional Supervisor, Polk County
Schools, Cedertown, Georgia.

Peers Ray, Director of Audio-Visual Aids, Rockford Public
Schools, Rockford, Illinois.

E. C. Waggoner, Director of Audio-Visual Education,
Elgin Public Schools, Elgin, Illinois.

L. C. Coederall, Superintendent of Ashland Public Schools,
Ashland, Indiana.

Vernon McKown, City Director of Audio-Visual Instruction,
New Albanb, Indiana.

Clyde K. Miller, Supervisor of Audio-Visual Education,
524 Garfield Street, Gary, Indiana.

Amos L. Claybaugh, Coordinator of Audio-Visual Instruction,
Davenport, Iowa.

Edward R. Lorenz, Director of Audio-Visual Education,
Dubuque, Iowa.

Frank Bean, Principal, Daviess County, Kentucky.

Fithian S. Faries, Coordinator of the Department of Visual
Education, Lexington Public Schools, Lexington, Kentucky.

Nelson C. Lelond, Principal of Forest Street School,
Westbrook, Maine.

Emit J. Berger, Instructional Aids Department, St. Paul
Public Schools, Monroe High School, St. Paul, Minnesota.

Richard C. Brower, Supervisor of Audio-Visual Radio,
Minnesota Department of Education,
Minneapolis, Minnesota.

M. I. Smith, Audio-Visual Extension Service, 230 Northrop
Memorial Auditorium, University of Minnesota,
Minneapolis 14, Minnesota.

Dr. Paul R. Wendt, Director of Visual Education,
University of Minnesota, Minneapolis 14, Minnesota.

C. W. Ballew, Audio-Visual Education, 23 Jesse Hall,
University of Missouri, Columbia, Missouri.

Miss Virginia Edwards, 2717 S. Kings Highway,
St. Louis, Missouri.

Cecil Floyd, Director of Audio-Visual Education,
Joplin Public Schools, Joplin, Missouri.

Elizabeth Golterman, Director of Audio-Visual Education,
St. Louis Public Schools, 4466 Olive Street,
St. Louis, Missouri.

Nelle Lee Jenkinson, In charge of Film Service
4466 Olive Street, St. Louis, Missouri.

L. A. Pinkney, Director of Audio-Visual Materials,
Kansas City Public Schools, Kansas City, Missouri.

F. M. Richardson, Supervisor of Audio-Visual Education,
St. Joseph Public Schools, St. Joseph, Missouri.

Alma B. Rogers, Director of St. Louis County Film Service,
6640 Washington, University City, Missouri.

Robert DeKieffer, Director of Audio-Visual Library,
Stephens College, Columbia, Missouri.

M. C. Gallagher, Superintendent of Yellowstone County Schools,
Billings, Montana.

Charles D. Dean, Assistant Superintendent of Yellowstone
County Schools, Billings, Montana.

E. J. Norgaard, Superintendent of Deer Lodge County Schools,
Anaconda, Montana.

G. S. Porter, Superintendent of Missoula County Schools,
Missoula, Montana.

Arne E. Shannon, Director of Bureau of Teaching Aids,
University of Omaha, Omaha, Nebraska.

Donald B. Grover, Head of Visual Education Department,
Hanover, New Hampshire.

Lenore Vaughn Earves, Professor of English, State Teachers
College, Newark, New Jersey.

Carl A. Roos, Elementary Principal, Director of Visual Education,
Metuchen City Schools, Metuchen, New Jersey.

William Lewin, Chairman of English Department,
Wequahio High School, Newark, New Jersey.

Lyola C. Pedrick, Coordinator of Audio-Visual Aids,
Camden High School, 209 Hadden Avenue, Haddonfield, New Jersey.

William P. Cavies, Director of Audio-Visual Education,
Albuquerque, New Mexico.

Edward C. De Murth, Director of Special Activities,
Carlsbad, New Mexico.

Mr. Paul W. Masters, Director of Free Textbooks and Audio-Visual
Aids, State Department of Education, Santa Fe, New Mexico.

Mr. Harold E. Crandall, Office of Visual Aids, Department of
Education, 98 Oak Street, Binghamton, New York.

Samuel I. Hicks, Principal of High School, Pearl River,
New York.

Franklin T. Mathewson, Supervisor of Audio-Visual Education,
Public Schools, White Plains, New York.

Mr. E. Carleton Moore, Director of Audio-Visual Instruction,
Hempstead Public Schools, Hempstead, New York.

Alan H. Nicol, Supervisor of Visual Education,
Museum of Science, Humboldt Park, Buffalo, New York.

Mr. Paul Reed, Board of Education, 13 S. Fitzhugh Street,
Rochester 4, New York.

Dr. John N. Willmott, Garden City Public Schools,
Garden City, New York.

Kenneth M. McIntyre, Director of Utilization and Distribution,
Communication Center, Chapel Hill, North Carolina.

A. B. Holm, Director of Junior College Department,
State Teachers College, Mayville, North Dakota.

Walter M. Loomer, Coordinator, Elementary Education,
Grand Forks, North Dakota.

E. R. Manning, Director of Audio-Visual Aids,
State Teachers College, Miscot, North Dakota.

L. F. Bowman, Director of Audio-Visual Aids,
Upper Arlington, Columbus, Ohio

Leslie E. Frye, Director of Audio-Visual Education,
Cleveland, Ohio.

C. H. Gabler, Director of Audio-Visual Aids,
Massillon, Ohio.

M. F. Seitz, Director of Audio-Visual Aids and Safety Education,
1003 W. Spring Street, Lima, Ohio.

Roy E. Wenger, Coordinator of Audio-Visual Education,
Kent State University, Kent Ohio.

William Woeforth, Director of Visual Education,
Canton City Schools, Canton, Ohio.

F. C. Anderson, Coordinator of Audio-Visual Education,
Tulsa, Oklahoma.

Gerald D. Holstine, Director of University School and Teacher
Education, Norman, Oklahoma.

Ella Ortner, Coordinator, Audio-Visual Aids, Jay, Oklahoma.

Mr. Arthur Brachman, Director of Visual Instruction,
Forest Grove Union High School, Forest Grove, Oregon.

Mr. Amo DeBernardis, Director of Visual Instruction,
Portland Public Schools, Portland, Oregon.

Mr. C. W. Strong, Director of Visual Instruction,
Springfield Public Schools, Springfield, Oregon.

Mr. R. W. Tavenner, Director of Visual Instruction,
Salem Public Schools, Salem, Oregon.

Mrs. DeWitt Brunson, Director of Instruction,
Ofangeburg City Schools, Ofangeburg, South Carolina.

W. H. Stroud, Director of Audio-Visual Program
Parker School District, Parker South Carolina.

Elsie Burrell, Supervisor of Blount County Schools,
Maryville, Tennessee.

Mr. E. C. Stimbert, Memphis City Schools, 317 Popular Avenue,
Memphis, Tennessee.

Miss Millie White, Supervising Teacher in Putnam County Schools,
Cookeville, Tennessee.

Agnes Justice, Supervisor of Audio-Visual Aids,
Nashville City Schools, Hume-Fogg Building,
Nashville 3, Tennessee.

H. W. Embry, Consultant in Visual Education,
Dallas Independent School District, Dallas, Texas.

Dr. W. W. Freeman, East Texas State Teachers College,
Commerce, Texas.

A. L. Long, Head of Education Department, Stephen F. Austin
State Teachers College, Nacogdoches, Texas.

John H. McKey, Audio-Visual Education, El Pasco Public Schools,
100 W. Rio Grande Street, El Pasco, Texas.

W. T. Powell, Director of Audio-Visual Aids,
Sul Ross State College, Alpine, Texas.

Harold E. Wigren, Director of Audio-Visual Education,
Houston Independent School District, 1500 Louisiana Street,
Houston, Texas.

Elden A. Harding, Director of Visual Aids, Alpine School District
Lehi High School, Alpine, Utah.

Andrew J. Jones, Principal and Chairman of Audio-Visual
Committee, Box Elder, Utah.

Morris A. Shirts, Director of Audio-Visual Aids,
North Sanpate School District, Provo, Utah.

Orvil A. Watts, Director of Visual Aids, Dixon Junior High School, Provo, Utah.

Emmons N. Williams, Principal of Elementary Schools, Davis County, Utah.

Theodore Beers, Director of Audio-Visual Aids, Burr and Burton Seminary, Manchester, Vermont.

Lawrence Cramer, Director of Audio-Visual Materials, Bennington High School, Bennington, Vermont.

Paul Davis, Department of Science, Bellows Falls High Schools, Bellows Falls, Vermont.

Reginald Illingworth, Assistant Principal, Woodstock High School, Woodstock, Vermont.

James A. Keech, Instructor in Science, Audio-Visual Aids Director, Castleton Teachers College, Castleton, Vermont.

R. Curtis Laberton, Director of Visual Aids, Bradford Academy, Bradford, Vermont.

Everett Otis, Librarian, Director of Visual Education, Springfield, Vermont.

Harris C. Palmer, Director of Audio-Visual Education, Barre City, Vermont.

Paul Stockwell, Coordinator of Audio-Visual Aids, Brattleboro, Vermont.

Mrs. Elizabeth J. Clark, Supervisor of Audio-Visual Education, Lynchburg City, Virginia.

Mr. Hubert J. Davis, Norfolk County Teaching Aids Library, Portsmouth, Virginia.

Dr. Joseph B. Johnson, Supervisor of Teaching Materials, Arlington County Schools, Arlington, Virginia.

Felsie Riddle, Librarian, Audio-Visual Aids, Martinsville City Schools, Martinsville, Virginia.

Dr. J. Alex Roer, Director of Teaching Materials, University of Virginia, Extension Division, Charlottesville, Virginia.

Mr. S. G. Stewart, Augusta County Teaching Materials Center, Fishersville, Virginia.

Mr. Russell Ainsworth, Visual Education Coordinator, Foster High School, 13812 Avenue South, Seattle, Washington.

Miss Bernadine Batters, Director of Audio-Visual Education, Vancouver High School, Vancouver, Washington.

Mr. Earl Baugh, Coordinator of Visual Education, Port Townsend High School, Port Townsend, Washington.

Mr. Raymond Beard, Coordinator of Visual Education, University Place School District, 2708 W. Grandview, Tacoma, Washington.

Daisy Bemiss, Coordinator of Visual Education, Sultan School District, Sultan, Washington.

Mr. Leo. W. Breuer, Administrative Assistant in Charge of Visual Education, Shoreline School District No. 412, 1st. Avenue N. E. at East 128th Street, Seattle 55, Washington.

Mr. Harold W. Coman, Supervisor of Visual Education, Spokane School District, West 503 4th Avenue, Spokane, Washington.

Mr. John Dawson, Director of Audio-Visual Education, Okanogan School District, Okanogan, Washington.

Miss Lois Dunn, Director of Instructional Aids, Wide Hollow School District, Route 4, Yakima, Washington.

Mr. Richard Elliott, Assistant Director of Visual Education, Tacoma School District, Tacoma, Washington.

Mr. George Eisentrout, Coordinator of Visual Education, Marysville School District, Marysville, Washington.

Mr. Ross Glover, Coordinator of Audio-Visual Education, Whatcom Junior High School, 810 Halleck, Bellingham, Washington.

Mr. David Hartl, Director of Visual Education, Omak School District, Omak, Washington.

Mr. Morris W. Hutchinson, Visual Coordinator, Fife School District, Route 2, Box 99, Tacoma, Washington.

Alice Kenyon, Director of Audio-Visual Education, Walla Walla School District, Walla Walla, Washington.

Miss Murtle Larrabee, Grade 6, Omak, Washington.

Mr. Ernest Neuman, Visual Education Coordinator, Chehalis Junior High School, Chehalis, Washington.

Mr. Roy O'Neal, Visual Education Coordinator, Battle Ground District, Battle Ground, Washington.

Mr. Howard Roe, Director of Visual Aids, Elma Public Schools, Elma, Washington.

Mr. Walter B. Schultz, Visual Education Coordinator, Grand Coulee School District, Grand Coulee, Washington.

Sister Mary Consolata, Visual Aids Director, Visitation Villa School, Route 8, Box 665, South Tacoma, Washington.

Mrs. Maxine Swanson, Supervisor of Instructional Aids, Spokane County Court House, Spokane, Washington.

Mr. Tom Taylor, Director of Instructional Aids, Toppenish High School, Toppenish, Washington.

Mr. Joe Testa, Lester, Washington.

Mr. Edward J. Trimble, Director of Instructional Materials, Clover Park School District, 11023 Gravelly Lake Drive S.W., Tacoma 9, Washington.

Mr. Chester Ullin, Director of the Bureau of Instructional Materials, Kitsap County Schools, Bremerton, Washington.

H. B. Allen, Director of Audio-Visual Aids, State University, West Virginia.

Joseph W. Ervin, Coordinator of Visual Aids, Elkins High School, Elkins, West Virginia.

Thomas D. Clemmens, Director of Audio-Visual Services, State Teachers College, Milwaukee, Wisconsin.

Merlin J. Lucia, Director of Audio-Visual Services, Green Bay Public Schools, Green Bay, Wisconsin.

Nicholas A. Magaro, Audio-Visual Chairman, Kenosha, Wisconsin.

Maurice C. McCanna, Director of Audio-Visual Aids, Racine, Wisconsin.

R. A. Petrie, Supervisor of Audio-Visual Education, Milwaukee, Wisconsin.

Robert C. Wheeler, Director of Audio-Visual Aids, Waukesha, Wisconsin.

L. W. Wilson, Coordinator of Audio-Visual Aids, Janesville, Wisconsin.

Clarence D. Jayne, Assistant Director of Adult Education, University of Wyoming, Laramie, Wyoming.

Cecil K. Dotts, Director of Secondary Education, Department of Public Instruction, Honolulu, Territory of Hawaii.

APPENDIX C

The data submitted in the returned questionnaires included a number of comments by the audio-visual coordinators. The comments were not solicited, however, they furnished additional data that may be of value in determining the status of teacher constructed audio-visual aids. These comments have been included in Appendix C.

"Aside from some rather unique bulletin board materials used by one of our teachers in the teaching of Junior High School mathematics, all of the materials used in our rather ambitious audio-visual program are of the ready made varieties."

"I don't think we have any outstanding teacher constructed audio-visual aids."

"Teachers prepare many kinds of audio-visual materials. We don't know of any one particular kind that is used more than another. Such things as maps, science illustrative materials, scrap books, etc., are often developed."

"We don't produce much in the classroom except bulletin board displays and similar collections of illustrations."

"I am sure that many of our teachers make friezes, charts, collections of objects, etc., in organized form, etc."

"In supervision, I have made rather extensive use of the 35mm. camera for exchanging and recording ideas as to procedures, as well as materials. This year we plan to make recordings of a number of selections from literature and reading books, for use in the classroom in connection with the study of these selections. Our purpose will be to add interest, to improve interpretation

and enunciation—in short, to demonstrate and encourage effective reading."

"We use typewritten slides for auditorium projection, for music and etc. I make 2" x 2" slides from miniatures found in materials from Canada, Mexico and from books and magazines. We have a trained lithographer and photographer who plies his trade and makes 3 $\frac{1}{4}$ " x 4 $\frac{1}{4}$ " slides for city-wide use. He also makes pictures for the superintendent's annual, and copies pictures from Life and other magazines. Our teachers use every possible source for bulletin boards and notebooks. The librarian has displays of bookjackets, reference material, current events and other pertinent materials. Our English teachers use coordinated material done in the art department, with the record player and projection equipment. This is also done by language teachers. History, geography and commercial teachers collect pertinent material and mount it to be shown in a Baloptican. The athletic department and clubs make posters from magazine materials for teaching hygiene. Our distributive education department has a model store and display center constructed from materials secured from local stores. We have a mimeographed school newspaper, done by pupils with teachers assisting."

"Knowing well the great variety of chart and three dimensional

teaching materials that were produced and used so effectively by the armed services in their training program during the war, we have given considerable thought to the possibilities of encouraging the production and use of such materials by teachers in our school system. In our judgment, it is a wonderful idea, but too costly and too impractical for application in a school system such as ours. In the first place, regular teachers just do not have the time in their schedules for the production of such materials. Second, in a school system of fifteen hundred teachers, the supervision and administrative problems involved in setting up an extensive system of teacher made materials would seem too complex and costly to justify. Third, the cost of the materials, considering the waste and inefficiency that would result, would not be a small amount. This does not imply that some of our teachers do not make original audio-visual materials that they use in their own teaching. They do. But this is not done on any systematic or city-wide basis, and unfortunately we do not have centralized information about what has been done."

"Some of the most valuable work we have done is to use 3" x 4" slides, prepared by the children in class work. We also make use of these slides for background scenery for auditorium programs and find that they work beautifully. Several of our

teachers made relief maps in their classes. The children are given the experience of geographic relationships, as well as having an opportunity to manipulate the material. The art classes prepare slides in their work and then use them for discussion. Many of the teachers construct excellent posters and like material."

"Some of the primary teachers made a great deal of use of the 3" x 4" glass slides. The teachers developed the pictures and script, then combined the showing with the wire recorder."

"Generally, we believe that materials are most successful when they are made by students with assistance from instructors. In secondary schools, charts, graphs, maps, and slides are frequently made by committees of students with teacher guidance."

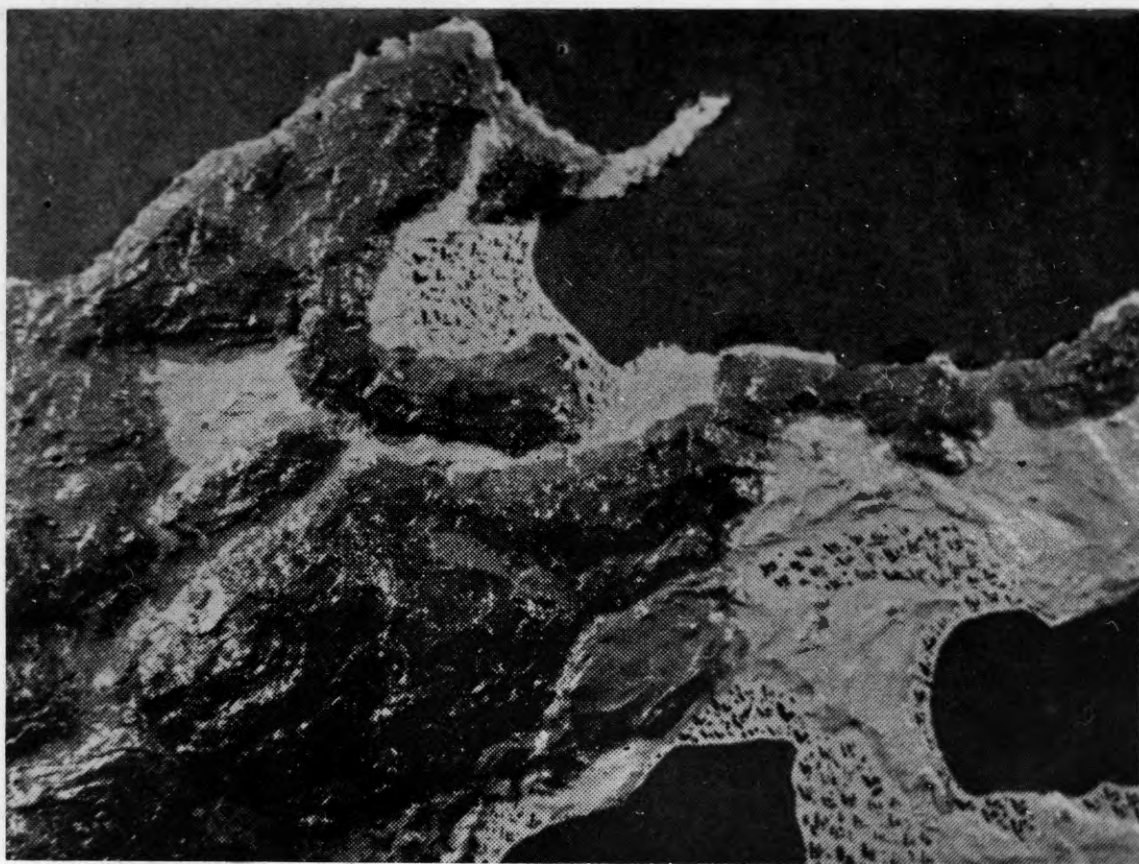
"The idea of assembling many kinds of teaching materials for use as a unit is not new. Such units of materials in Norfolk County are known as 'Teaching Kits.' These kits were developed cooperatively by pupils, teachers and the Norfolk County Teaching Aids Library. They are loaned to teachers from the library for a period of from three to six weeks. They are booked as units just as film, filmstrips or other audio-visual materials."

"Our teachers are well known for their extensive use of home made instructional materials, however, there is no great uniformity in the audio-visual aids they develop. Teachers here tend to develop their own aids for special needs."

APPENDIX D

Illustrations of some teacher constructed audio-visual aids are included in Appendix D.

A terrain model used to bring graphic evidence of the local terrain into the classroom.¹



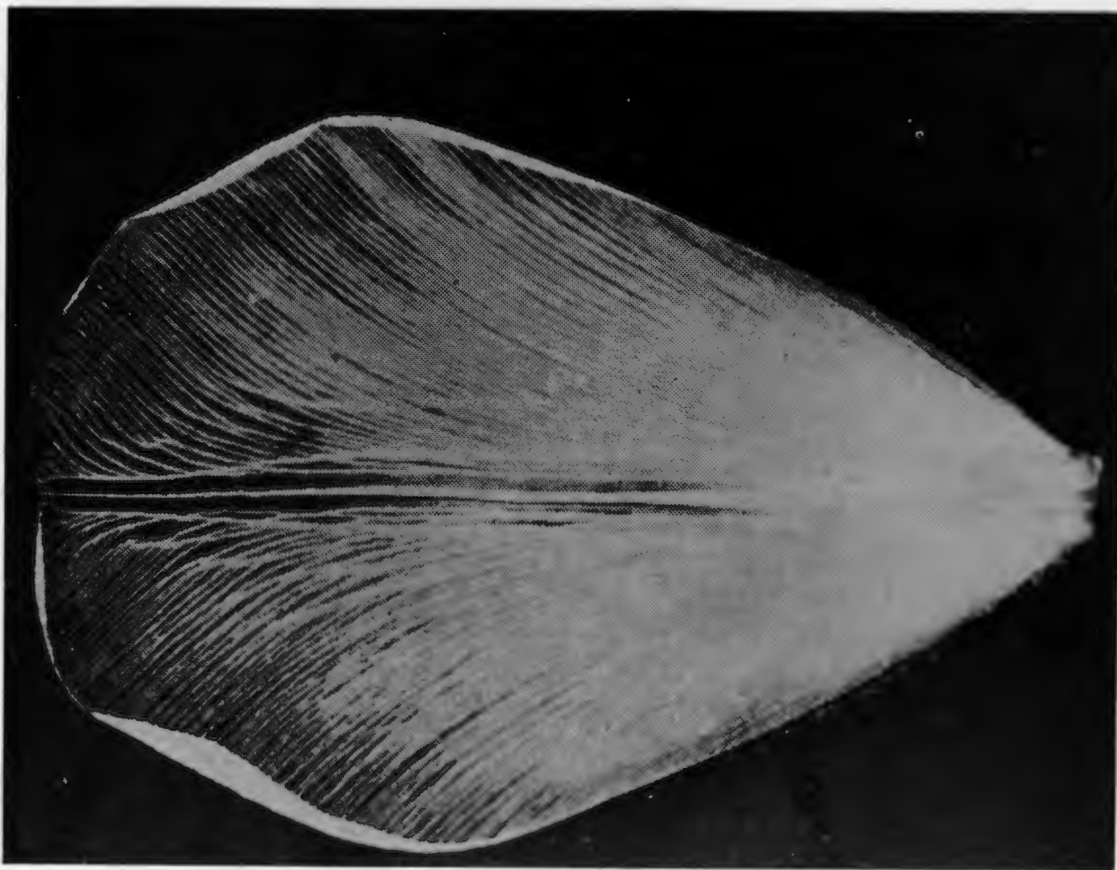
1. Moore, Lyell J., Embry, Henry W., and Benson, Esther M.,
op. cit., 33.

Constructing a globe is an effective means of helping the learner develop a concept of the world as a globe.¹



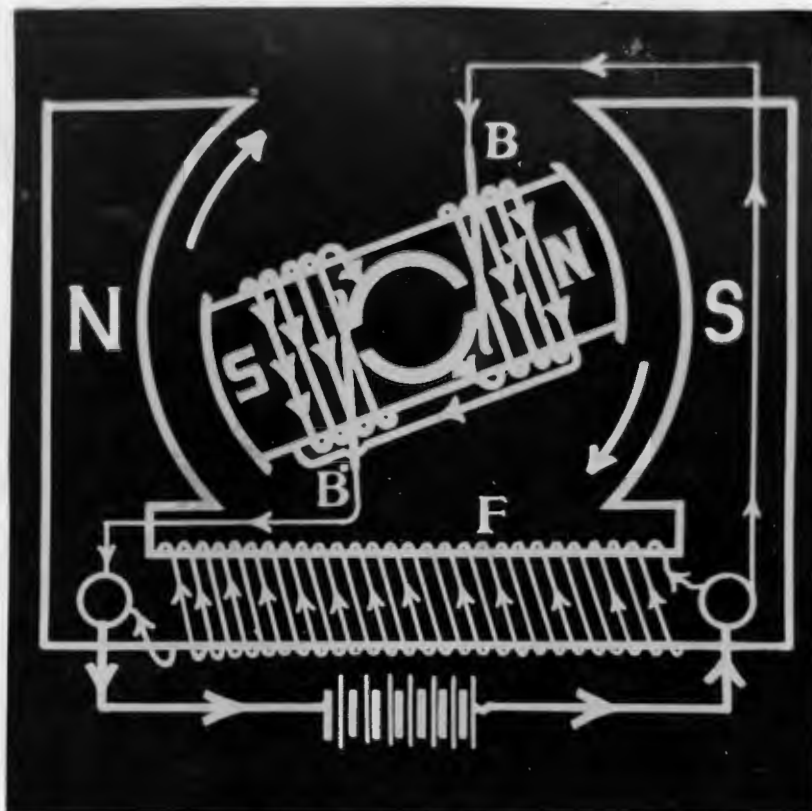
1. Sternig, John, op. cit., 34.

Leaf prints can be an effective aid in demonstrating to a class the different venations in leaves. These prints can be made by placing a pressed leaf on photographic paper, exposing them to light, and processing in photographic developing solutions.¹



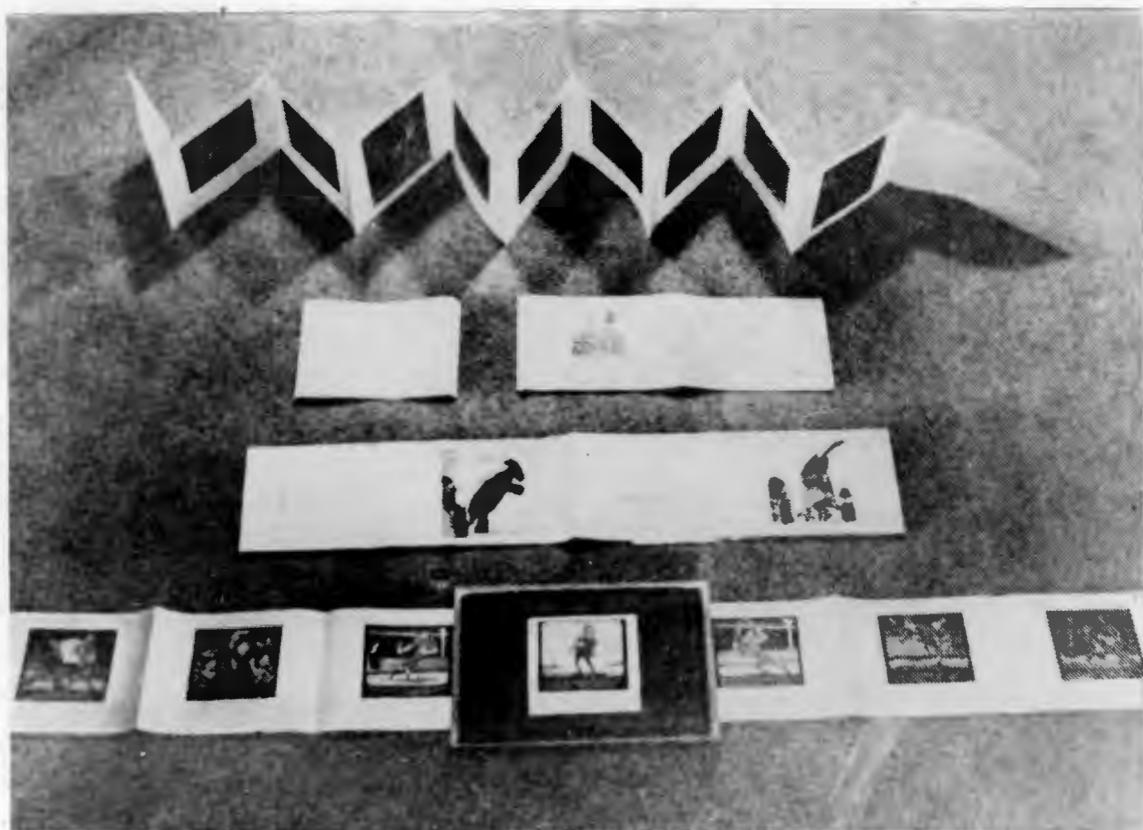
1. Power, Brother R. B. op. cit., 28.

The negative type slide results in a white on black image which can be projected directly on to the blackboard.¹



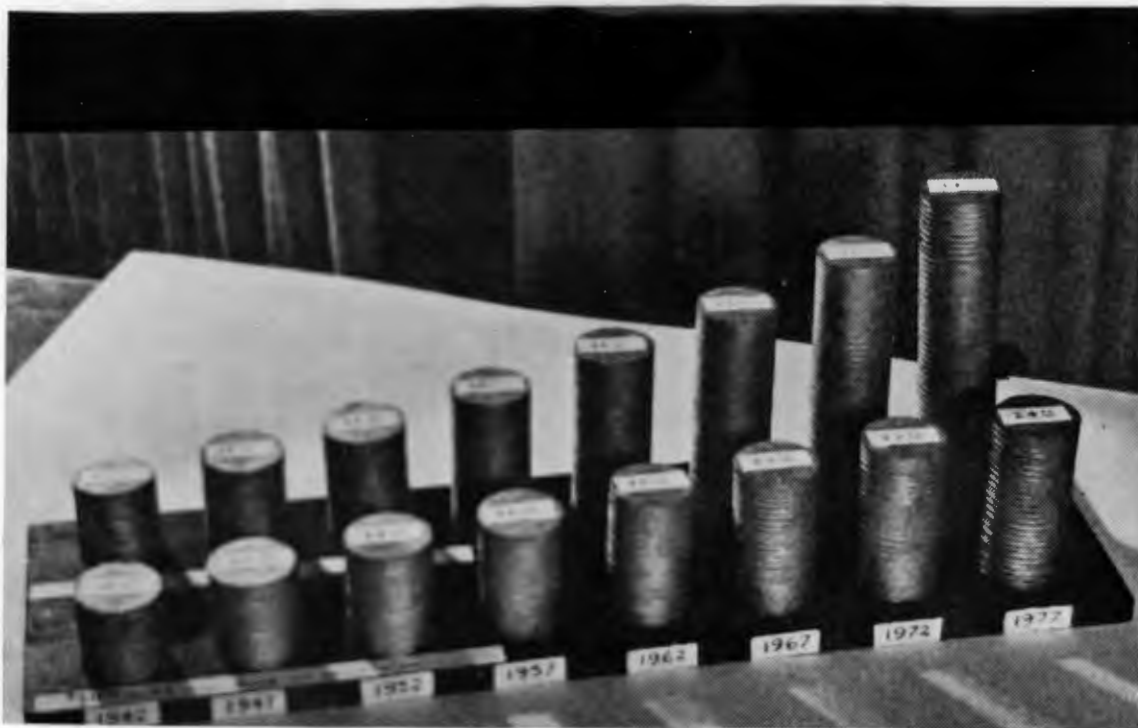
1. Myers, Edward T., *op. cit.*, 36.

"The opaque strip—a piece of paper six inches wide on which are mounted a series of pictures, is an effective aid to use with the opaque projector."¹



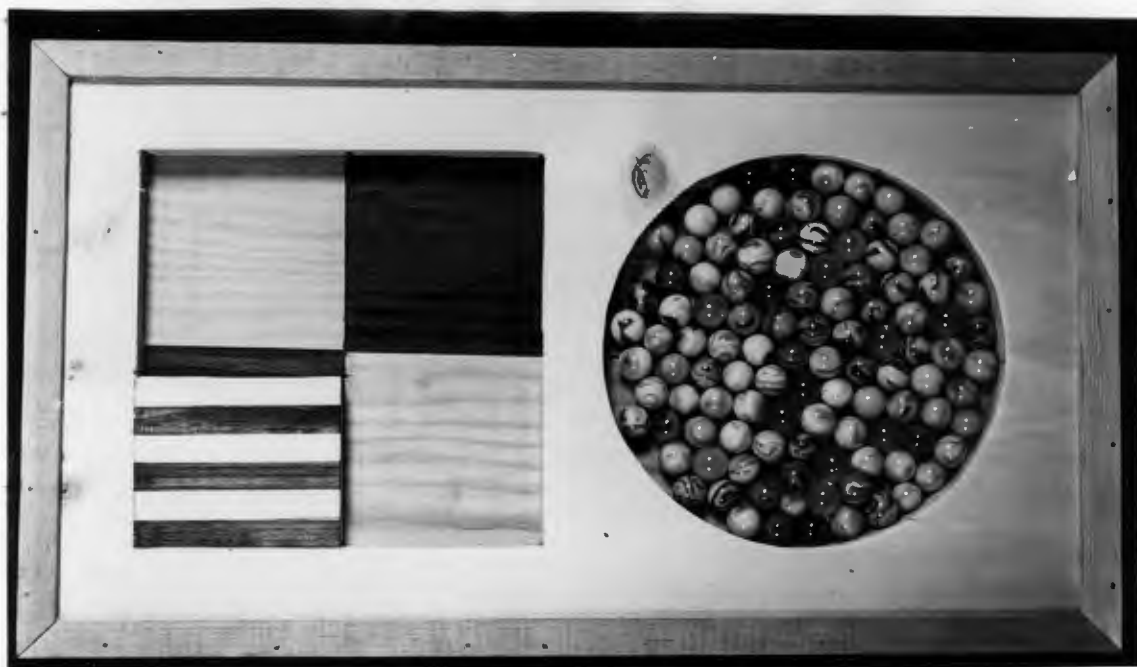
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1. Henry, Earl G., "Creative Activity With the Opaque Projector," See and Hear, 3:23, March, 1948.

"This model, made in the manual training department, shows the difference in the value of money invested at simple interest as compared to compound interest. The first column at the extreme left represents \$10 deposited in a bank. The front row shows the increase at simple interest; the back row, compound interest. From left to right each column shows the amount at five-year periods. As time passes, the difference which was not great at first becomes increasingly significant."¹



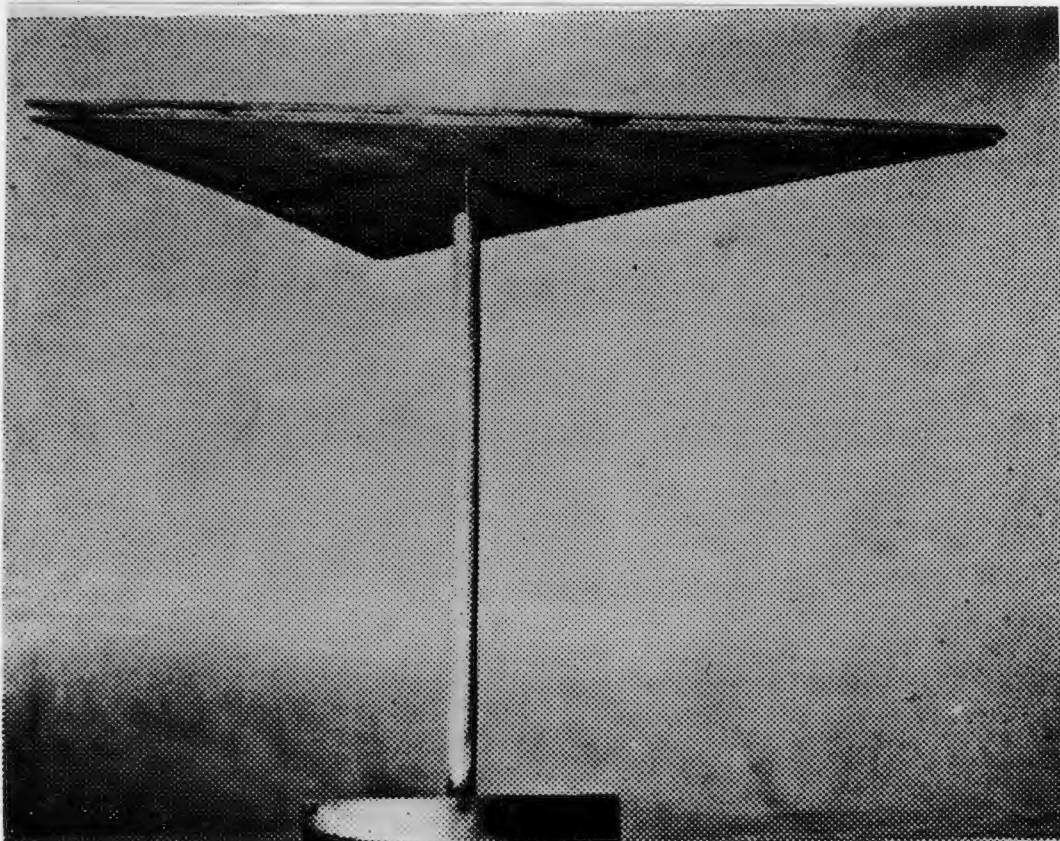
1. National Council of Teachers of Mathematics, *Eighteenth Yearbook*, op. cit., 369.

"A wooden box 2" deep is covered with glass. A raised partition divides the bottom of the box through the center. In one side is a depressed circle, in the other a depressed area composed of $3 \frac{1}{7}$ squares. The side of each square equals the length of the radius. The surface of the circle is completely covered with marbles which can be poured over to the other side and shaken down so that it exactly covers the surface of $3 \frac{1}{7}$ squares. This shows that the actual surface covered by the circle is equivalent to that covered by the squares."¹



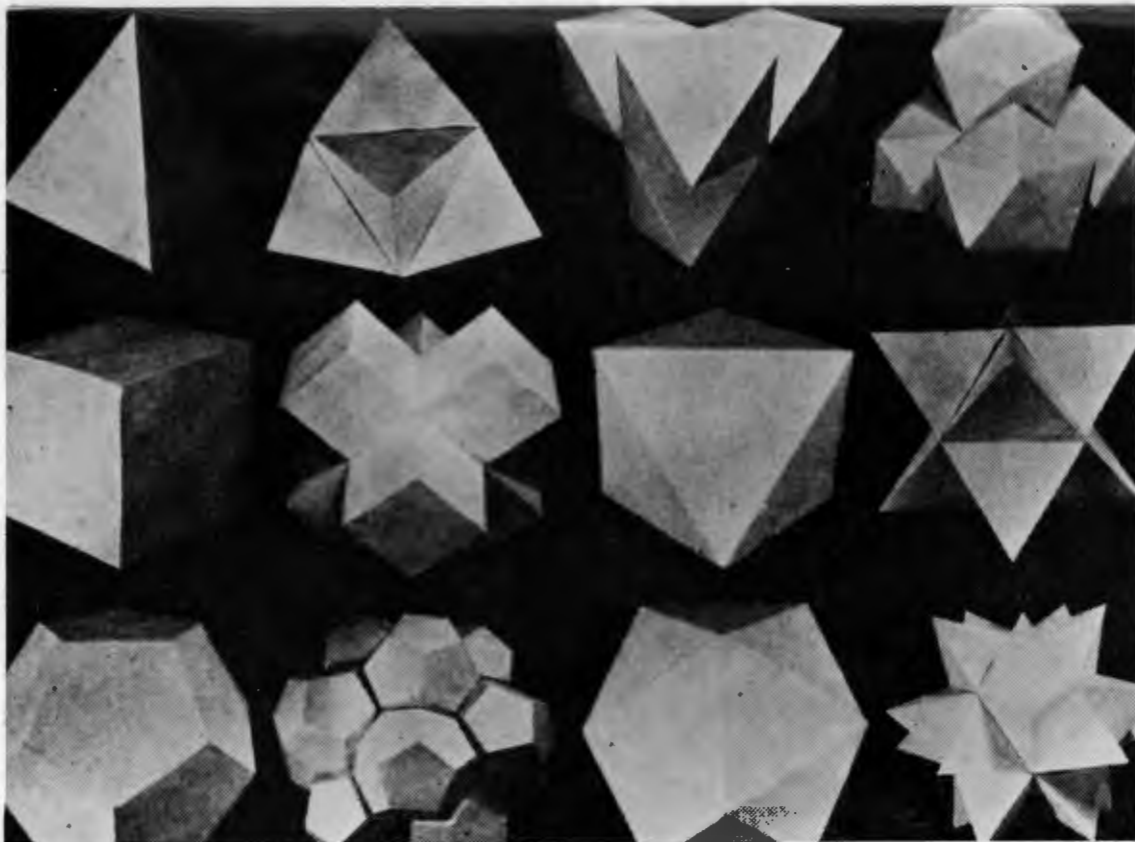
1. National Council of Teachers of Mathematics, Eighteenth Yearbook, op. cit., 369.

"The medians of a triangle meet at its "center of gravity." The model here shows how the triangle is in balance."¹



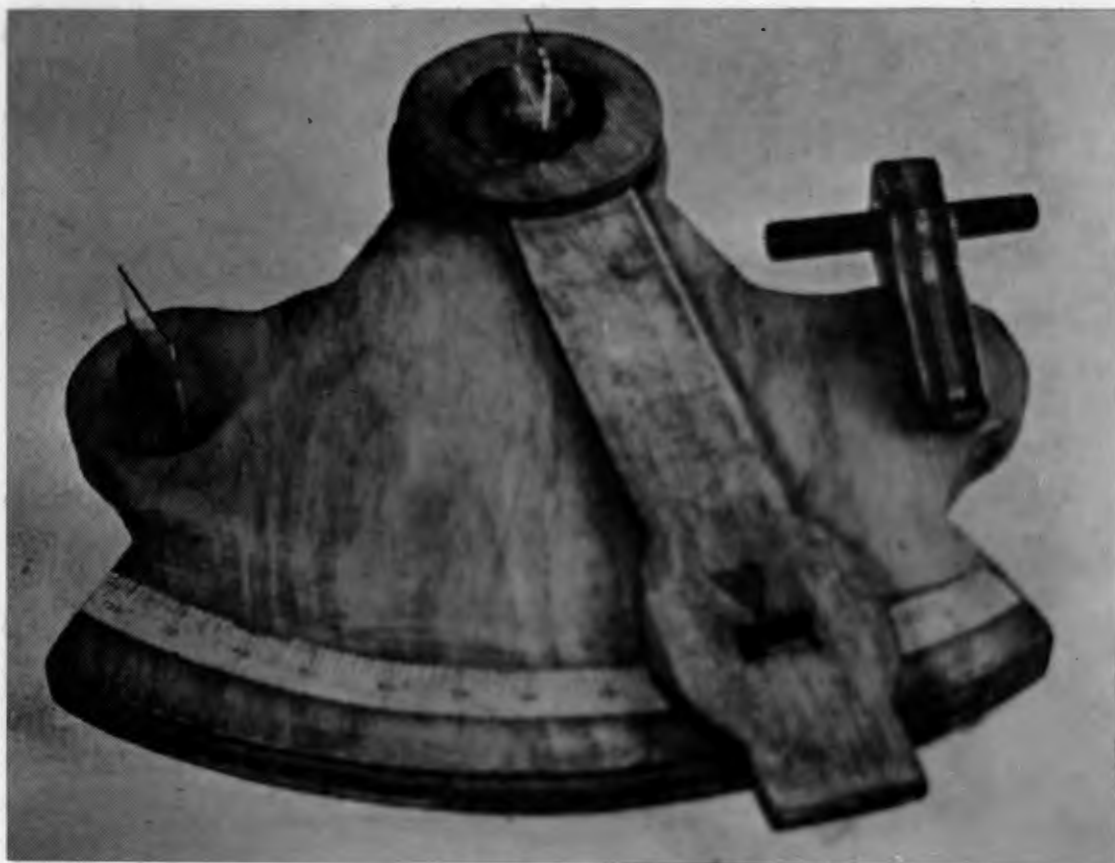
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1. National Council of Teachers of Mathematics, Eighteenth Yearbook, op. cit., 384.

The geometric solids shown below were constructed by using heavy weight construction paper and cardboard.¹



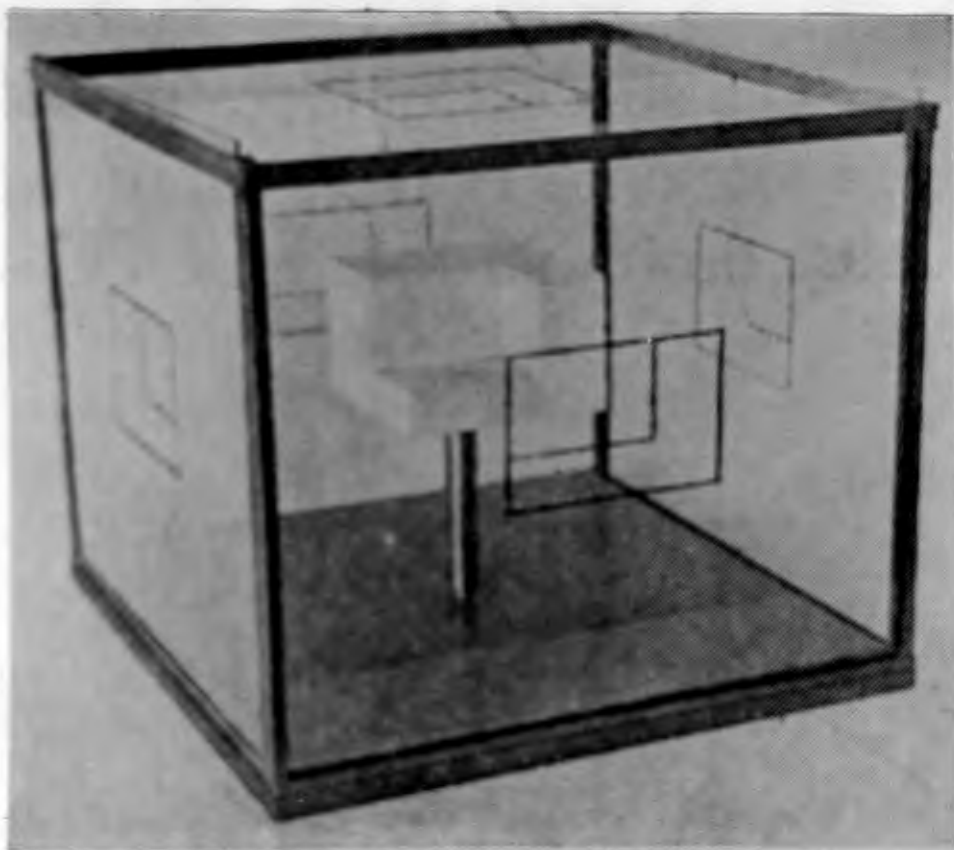
1. National Council of Teachers of Mathematics, *Eighteenth Yearbook*, op. cit., 399.

A functional sextant can be made of plywood and inexpensive ten-cent-store mirrors.¹



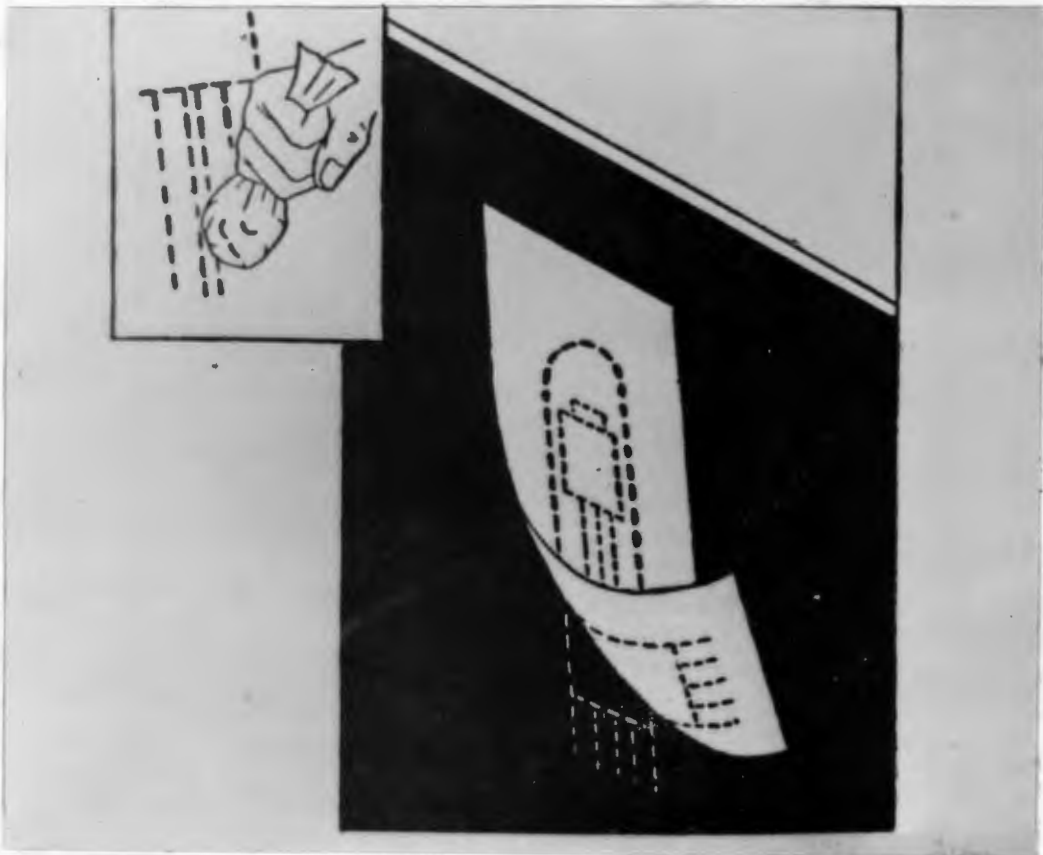
1. National Council of Teachers of Mathematics, *Eighteenth Yearbook*, op. cit., 406.

A projection case can be constructed to show the relationship of different views in orthographic projection. The object to be drawn is placed inside the glass box and the respective views—top, plan and side views—are drawn on the glass sides of the box.¹



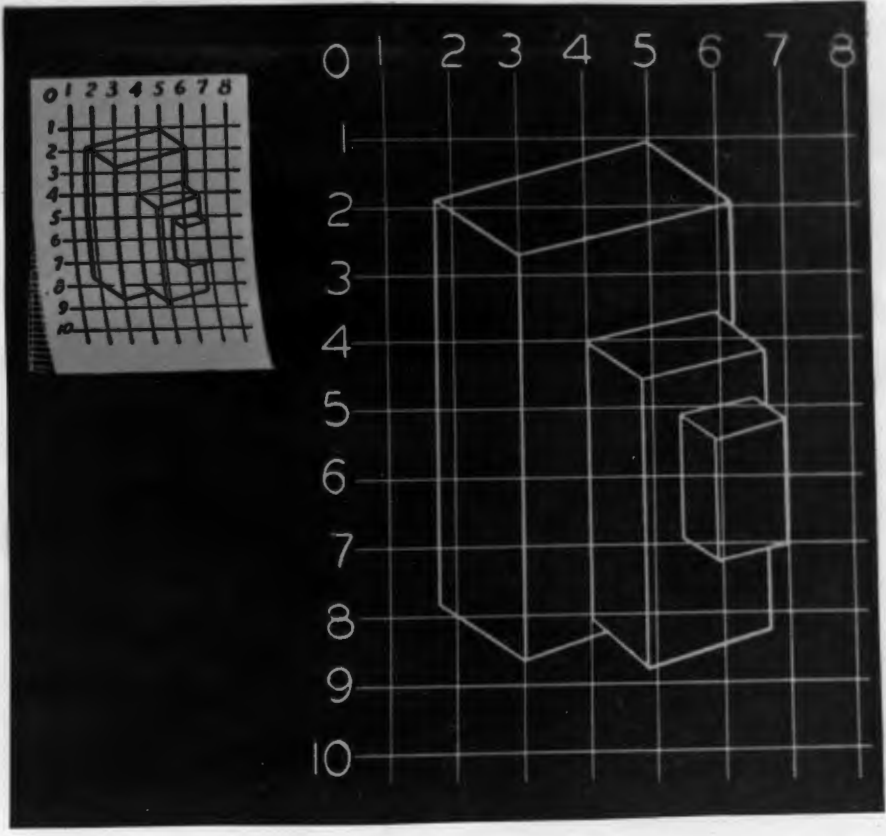
1. Weaver, Gilbert G., and Bollinger, Elroy W., op. cit., 65.

Patterns can be transferred to the blackboard by using the pounce method. A drawing is first placed on wrapping paper, then perforations are made with a tracing wheel along the lines of the pattern. The perforated pattern is placed on the blackboard and the lines are dusted with a bag of talc.¹



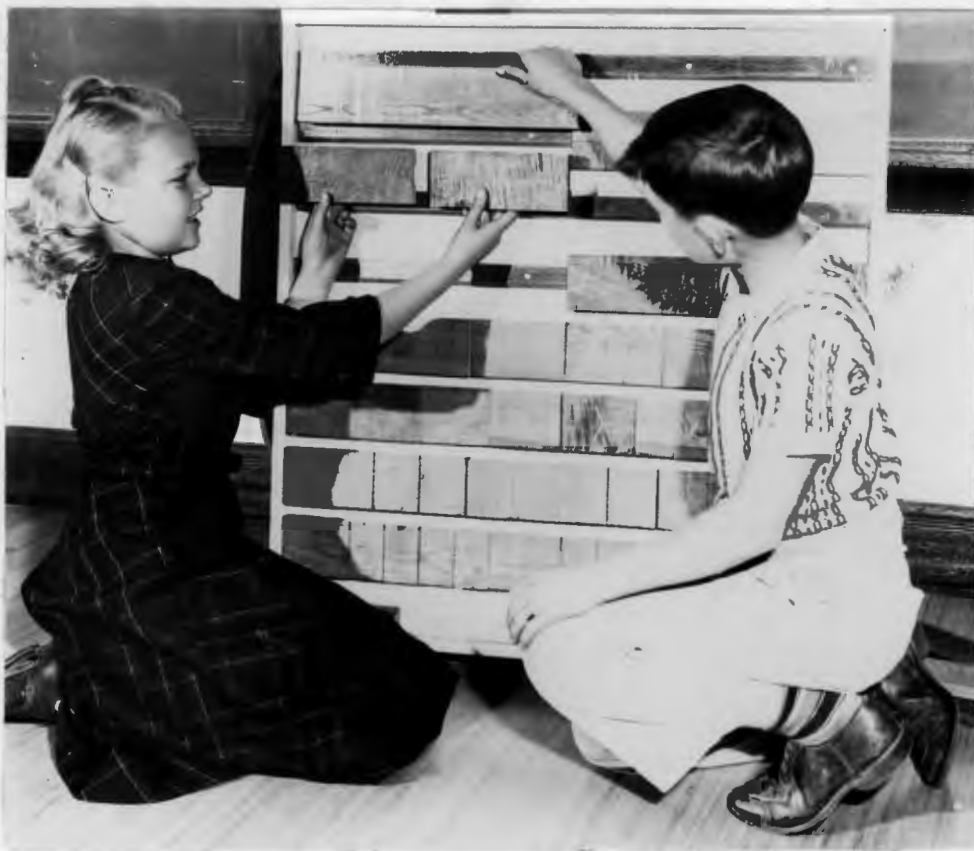
1. Weaver, Gilbert G., and Bollinger, Elroy W., op. cit., 46.

The square method can be utilized for enlarging and transferring from a small original to the blackboard.¹



1. Weaver, Gilbert G., and Bollinger, Elroy W., op. cit., 43.

A fraction board to help pupils visualize the fractional parts of a whole, can be made of wood blocks.



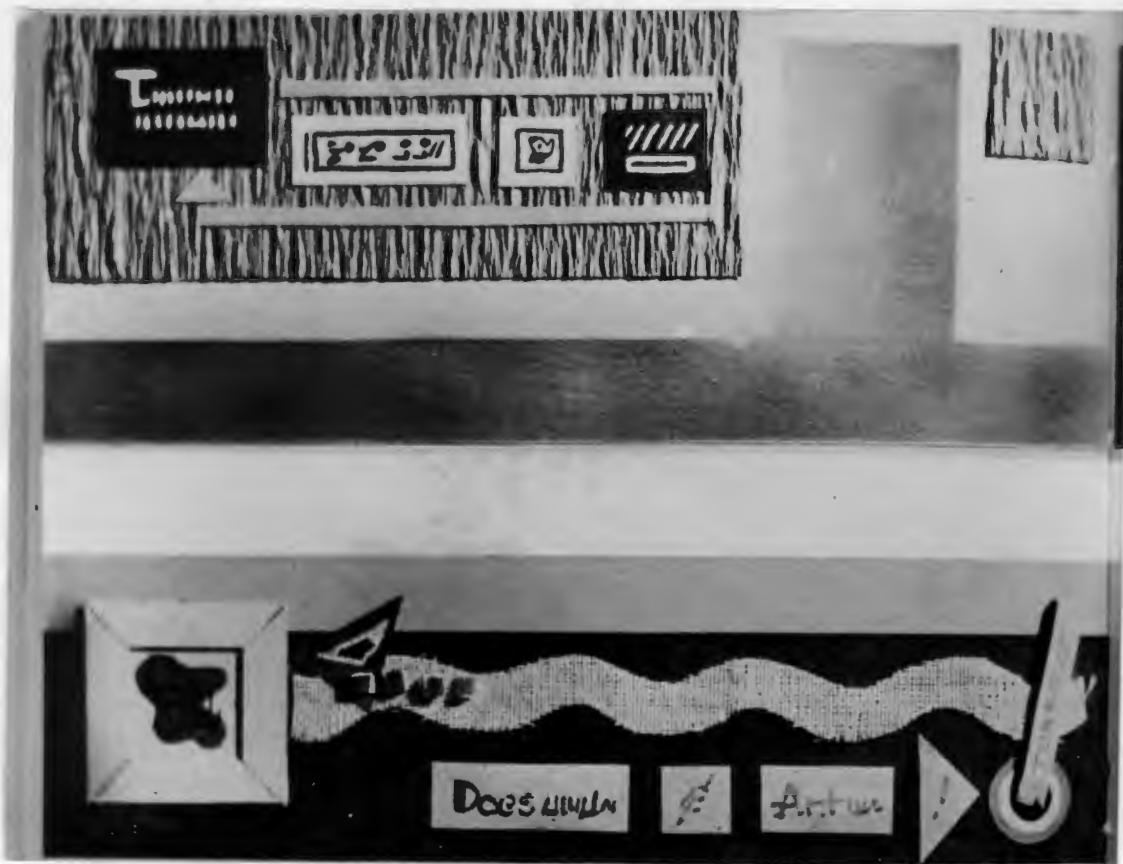
Flannel board materials for use in studying fractions can be constructed by pupils. Outing flannel, dyed various colors, is attached to cardboard with rubber cement and cut into the desired patterns.



A teacher constructed aid for teaching arithmetic is shown below. The row of holes on the right represents units, the second row tens, the third row hundreds and the row on the left, thousands.



Various kinds of material, such as burlap, monks cloth and texture paper, add to the attractiveness of bulletin board displays and make it more effective as a teaching aid.¹



1. Kinney, Lucien, and Dresden, Katharine, op. cit., 125.