DIORAMA CONSTRUCTION SIMPLIFIED

BY

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for Education 501
MONTANA STATE COLLEGE
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CHAPTER I
INTRODUCTION

The decade preceding the 1960's was an age when the interests of students' and adults' were many and varied. Because of this diversification of interests, ideas to be presented had to be short, to the point, and interesting for effective communication. Each year history was being made, studied, and forgotten by students trying to keep up with the fast-changing pace of events. It was the opinion of the writer that there was a way in which important events could be recorded which would enable students not only to understand an event, but to gain an understanding of the forces or actions which led up to the event. It was the writer's contention that the preparation for and the construction of a diorama, a three dimensional scene incorporating three-dimensional objects with backgrounds in perspective, could stimulate and vitalize history courses at the high school level.

The Problem

The purpose of this investigation was three-fold: to construct a diorama, to produce a slide film set and guide, and to record the various steps in the construction of the diorama.

The Procedure

Using the assumption that a diorama can be an effective means of transmitting ideas, the writer constructed a diorama. The writer
gathered the ideas to be presented, worked the ideas into picture form and finally built the case into which the ideas, now changed into three-dimensional objects could be placed. The process was then recorded on film so that a teacher or student could use it as a guide for building other dioramas.

The instrument used to record the information was a 35 mm camera. This instrument had for some time been used as a medium of instruction. The ease with which processes could be recorded and presented made the 35 mm camera an excellent aid for recording and transmitting information. Furthermore, the cost of the finished product justified its use.

Limitations

The writer encountered factors which limited the size and scope of this study. It was found that there were relatively few references concerning diorama construction on an advanced level. Most available references were geared to the abilities of the pre-adolescent and adolescent child. Because it was the intention to prepare information geared to the level of both high school and college students, much of the research on the problem of diorama construction was original research. Any guides or aids concerning the use of specific materials used in the construction of the diorama were supplied by the manufacturer. Additional information related to this study and the construction of the diorama was gathered from field trips to museums and personal interviews with museum personnel within the State of Montana. Ideas
relative to actual diorama construction were noted, and where possible, used in the construction of the diorama. It was then only a matter of filming the individual steps in the process of diorama construction.

Definitions of Terms

For the benefit of the reader, the following terms are presented:

Dioramas refer to three-dimensional scenes incorporating three-dimensional objects with backgrounds in perspective.

Audio-visual aids referred to in this study include any aids which are capable of transmitting information—film, filmstrips, models, mock-ups, exhibits, photographs, slides, radio, charts, graphs or maps and dramatic participation. Only slide film and dioramas will be discussed in this study.

The terms filmstrips or 35 mm slide film include only transparent photographs which can be projected by the use of a projector or viewed with a pocket-size viewer.

The scope and importance of the diorama in teaching historical events is discussed in Chapter II.
CHAPTER II

THE VALUE OF THE DIORAMA

Without doubt, the value of the use of dioramas in museums is obvious: it is not only more pleasurable but also more meaningful to gaze at a three-dimensional actual scene taken from history. Equally important, however, is its value in the classroom where it can be a most effective means of stimulating students to the task of learning history. Brown and Lewis in their article "Making a Diorama Box," describe the importance of the diorama as a valuable communication device:

The three-dimensional displays of people and events, and the physical and living things associated with them, have long been important communication devices. Museums, using full-(or small) scale replicas of real-life situations, attract thousands who look at and learn from dioramas. Effective scenes can be made for the classroom, if judgment is used in the selection of subject matter and in the time expended for construction. Simplicity is the key: communication of big ideas is the objective of dioramas.¹

The Diorama Presents History

Just as effective scenes can be made for the classroom, it is also possible to utilize dioramas for museum display. Toole, former director of the State Historical Library in Helena, Montana, has pointed out that only the museum can make history human. In an article written for "Museum News," Toole goes on to say that:

History can be taught in schools from books. In graduate schools it can be taught from documents. But only the museum can really make it human. Here are the pots and the pans, the sword and the buckler; the petticoat. Here is the bust of the man who launched the ships. Here are the ships themselves. You don't read of these events, you see the objects and there is an eloquence in the thing itself for which words are a poor substitute.¹

Thus the diorama makes it possible to extract from history one moment of time, and through the use of three-dimensional figures to picture the event as it supposedly happened. It may be added that the effectiveness of the diorama can be measured by the degree of authenticity of costume and the settings used to portray the event.

The Diorama as a Means of Expression in the Classroom

The diorama provides a means of expression by which a class, working as a group can investigate and construct an event of the past. The student who is interested in history, is given the opportunity of picturing various scenes in a more tangible way. Moreover the student who may be uninterested in history is given the second chance through the medium of art to become acquainted with, and awakened to, a heretofore abstruse or boring subject. The value in either case lies in the fact that each student's contribution to the diorama, however small, is still his own. His contribution might be the wiring of the shell, the painting of the background, the mixing of plaster-of-paris or the

lettering of the plaque that explains the action of the diorama. Whatever the case might be, the student will have been brought into contact with the historical event, and then given the opportunity of recreating this event in a picturesque way.

Information relevant to the procedures followed in the construction of the diorama will be presented in subsequent chapters with the first—selecting the subject matter for the diorama in Chapter III.
CHAPTER III
SELECTING THE SUBJECT MATTER FOR THE DIORAMA

Establishing the theme or general idea to be presented was the first problem that confronted the writer. The process of selection of the idea was governed by the stated objective "simplicity is the key: communication of big ideas is the objective of dioramas." The following excerpt by Overholser, with the key ideas underlined, illustrates the process followed in selecting suitable word pictures:

"Railroad Ends River Traffic"

Fort Benton always showing a flair for history, turned out with pomp and ceremony for its own funeral September 29, 1887. The day the Manitoba (now Great Northern) railway reached this city. The Fort Benton brass band played, flags and bunting decked the carriages which transported ladies of the town dressed in their finest gowns and the men turned out in derbies and polished boots. Mrs. James J. Hill, wife of the Empire Builder drove the silver spike in the coffin of Fort Benton's commercial supremacy. Three days later, the first box cars of freight arrived here from St. Paul.

Enroute to Fort Benton, sweating track crews laid 530 miles of track, beginning April 2, at Minot. August 11, 1887, somewhere in the boundaries of Chouteau county, the steel gangs laid eight miles and 169 feet of rails, a record that still stands (and commemorated here). The Manitoba employed 9,000 men and 7,000 horses on that record job.

Steamboats were busy all summer carrying supplies for the railroad and Montana settlements, then dropped down the Missouri never to return. The big Fort Benton merchants quit business or moved to Great Falls or Helena. The stage coach was run to the Judith Basin a few years longer, but the steamboats' era had ended. Freighters and rivermen drifted away.

Historic ties remain, however, and there's scarcely a pioneer Montana family who recalls its long-ago relations with Fort Benton, the "Birthplace of Montana."¹

¹Reprinted with permission of Joel F. Overholser, Fort Benton Community Museum, Fort Benton, Montana.
After the key ideas were chosen, a series of thumbnail sketches were drawn to illustrate each idea. From these sketches, one was selected as the most suitable for the situation and enlarged from the original thumbnail sketch. Details and color were then added to the drawing. With this definite drawing in mind for the diorama, the artist then determined the amount of space available for his finished product. The information thus received enabled him to select the scale of reproduction. Other factors relative to the placement and size of the diorama case will be illustrated later in this study.

In scenes depicting Montana history, it was found to be advantageous to go to the location of the actual event. At this time the artist can use his imagination in setting the scene of the incident. Furthermore, the actual geographic location enables him to incorporate into the original sketch an accurate and authentic picture of the surroundings. Here it should be mentioned that a camera is a valuable asset for recording the scene for later use in the studio or classroom.

Having established what the viewer will see within the diorama case, the procedures for constructing the diorama case can be presented.
CHAPTER IV
DIORAMA CASE CONSTRUCTION

There are two methods of proceeding with the construction of the diorama case depending on which suits the immediate situation. The case can be constructed as one unit and upon completion can be moved into the desired position. The advantage of this method of construction is that the case is a self-contained unit and can be transported from one location to another. This type of construction is usually used where the artist does his work in a studio for placement at another location. The disadvantage of this type of construction is the further adjustment of height required at its installation (see oblique view, page 10).

The second method, the one used in the construction of the diorama in this study, consists of building the diorama case as part of the museum wall (see side view, page 10). This method was chosen because the advantage of this type of construction is the strength and rigidity which is the result of being attached to part of the interior framing of the building. After suitable framing has been erected, the curved background of tempered masonite is attached to the vertical studding with flat head screws (see side and top views, page 10). Masonite is used because of its flexibility, strength, and surface, on which paint will bond easily and firmly. Seams and holes where heads of screws are visible, are covered with spackling cement, allowed to dry and sanded.

Plywood 5/8" or thicker is used as flooring for the diorama
GENERAL LAYOUT OF THE DIORAMA CASE

A Cross sectional cut line
B Fluorescent fixture (2--40 watt)
C 1/8" tempered masonite
D Joint or seam
E 1 x 2" stock joining masonite sections
F Permanent museum wall
G Plate glass set at 15° to 20° to the perpendicular
H Masonite attached with flat head screws to the bracing and the head of the screws covered with filler
I Eye level approximately 67" from floor
J Distance to floor from bottom of opening--38"
K Floor to ceiling studs
case. This material will not only give the necessary strength for supporting the weight of the exhibit but will also support the artist who uses it as a platform when painting the background.

Lighting for the inside of the case is supplied by 2–40 watt fluorescent tubes. This type of light was selected because of its ability to illuminate all areas of the interior of the case without casting shadows (for placement, see top view, page 10).

An opening into the case is so constructed that a window can be installed at a 15°–20° angle to the perpendicular. The angle of the pane is necessary to reduce reflections and glare that might be present directly across from the diorama case, and would detract from the effectiveness of the diorama (see oblique view, page 10).

The interior of the case is finished with the application of two undercoats of white paint applied to the background and ceiling. The case is then ready for the construction of the wooden framework which will give shape and form to the foreground (see plate 1, page 19).

The information in Chapter V describes the steps followed in constructing the interior of the diorama case. Each step has been illustrated on acetate overlays which are presented in the latter part of the following chapter.
CHAPTER V
FINISHING THE DIORAMA CASE

The information in this chapter refers to the acetate inserts found on pages 14-20. It has been the writer's purpose to show the steps followed in completing the interior of the diorama case.

Plate 1, page 20. Before any construction inside the diorama case can be started, a coat of primer must be placed on all interior surfaces of the case. This will serve as a basecoat for the subsequent painting of the scenery. Any good brand undercoat will serve this purpose.

Lighting can be supplied by two 40 watt fluorescent tube fixtures. The advantage of this type of light is its ability to eliminate undesirable shadows.

The framework upon which the terrain, the models and the figures will be placed, is then constructed inside the case. Terrain features can be varied by adding or subtracting blocks of wood.

Plate 2, page 19. Chicken wire or porch screen is next placed over the framework, and nailed or stapled in place. It is recommended that heavy screen be used, this enables the artist to simulate the irregularities in the terrain. Cheese cloth is then draped over the wire, and is also stapled or nailed to the frame. This is especially necessary in places where sags might appear in the fabric due to the weight of the plaster-of-paris.

Plate 3, page 18. Plaster-of-paris, the consistency of thick cream, is then applied to the cheese cloth. This plaster-of-paris
covering should be about 1/2" thick and should be applied to all portions of the cloth which will be within sight of the viewer. In areas where figures will be placed this coat should be 3/4" to 1" thick to give the added strength necessary to support the weight of the figures.

Plate 4, page 17. Using the color sketch of the scene as a guide, paint the background scene on the tempered masonite. It is especially important that the painting be done under the same illumination in which it will be viewed, since some pigments appear as different hues of the same color when seen under other light sources. It has been found that artist's oils not only give the best effect but can also be modified or added to more easily than other ready-prepared materials.

Various media can be used to paint the foreground with tempera and artist's oils being the most popular. Tempera paint can be applied with an airbrush and the result is an even, well-blended surface. It is recommended that the foreground be painted with tempera because of its quick drying qualities on the plaster-of-paris. This permits the artist to position foreground materials without gathering paint smears on the articles being positioned. After the foreground is painted, natural materials such as sticks, small limbs or branches of trees, small rocks, sand, or dirt can be used as a natural cover over the painted surface. The primary purpose of the foreground paint is to camouflage the whiteness of the plaster-of-paris.

Plate 5, page 16. With the background and foreground painted, the figures can be positioned on the plaster-of-paris (see Chapter VI concerning figure construction).
Plate 6, page 15. Because there is a tremendous amount of water contained in the mixing of plaster-of-paris, it is suggested that the glass panel of the diorama case be left off for a period of a week or ten days after the actual pouring of the plaster-of-paris. If the case is enclosed too quickly the moisture given off will cause mildew to form on the foreground scenery, this effect of forming mildew may be desirable. On some occasions a small fan or heater has been used to speed up the evaporation and drying time within the case.

The information in the following chapter describes the process of constructing figures by the wax process. This process has been chosen for its simplicity.
Acetate plates 1 through 6, pages 15 through 20 could not be scanned due to condition issues.
CHAPTER VI
PRODUCING THE FIGURE BY THE WAX PROCESS

The material used to construct figures for this study was petroleum wax, a by-product of the oil industry. Petroleum wax is readily available through the "Archie Bray Foundation," located in Helena, Montana.

Sketches in this chapter, illustrated by figures 1-5, show the steps in constructing the three-dimensional human figures using petroleum wax.

Figure 1 represents the wire armature which is temporarily attached to a block of wood while the warm wax is being applied.

For the best results the wax should be heated to 90° to 100° Fahrenheit.
The warm wax is applied to the armature. Care should be taken to insure a good bond of one section of wax to another as the artist molds and shapes the figure.

After the figure has been constructed the figure can be painted. Artist's oils directly from the tube will adhere to the wax without previous preparation of the wax figure.

After the figure has been painted it is removed from the steadying board and the wires are inserted into specially drilled holes in the plaster-of-paris. If the plaster-of-paris is from 3/4" to 1" thick, the figure will be supported without danger of tipping.
The information found in Chapter VII deals with the slide film guide. Accompanying this chapter are 12 slide films showing the various steps in the construction of the diorama case.
CHAPTER VII
THE SLIDE FILM GUIDE

The slide film guide does not tell the story of the construction of the diorama completely in words, but rather through the medium of film shows the various steps in its construction. It is taken for granted that the skills of oil painting and sculpturing, the process of mixing plaster-of-paris, the handling of hand tools, plus any other basic art skills are already known. It is, therefore, the attempt of the slide film set to show the scenes behind the scene of the diorama.

Slide 1. The railroad ends the river traffic. A short word sketch of the diorama enables the viewer to get more out of the diorama. Here the viewer is subjected to history. If the diorama is well enough done to attract the viewer's attention, it may also serve to stimulate his curiosity as to what is actually happening, and why. Slide 1 shows the location of this information, readily available for the diorama viewer. Also shown is part of the internal structure upon which the terrain is built and where the various figures are to be placed.

Slide 2. This slide shows a view of construction that will eventually be a hill. In this preliminary construction it is well to use stock that is at least 3/4" in thickness.

Slide 3. Chicken wire is attached to the frame with staples or nails that have been clinched over the wire.

Slide 4. The flat portion in the right center is constructed from 1/4" plywood. This particular section will be the roadbed for the railroad tracks.
Slide 5. Cheesecloth has been placed over the board and wire construction, and anchored with staples or nails.

Slide 6. A layer of plaster-of-paris has been spread over the section.

Slide 7. This shows the right section of the diorama with its covering of plaster-of-paris.

Slide 8. Cardboard figures representing the figures that will be constructed are placed in position. This will orient the artist as to the horizon line, as well as to the placement of pertinent points of interest on the background. It will also aid him in his final determination of the scale for the construction of the figures.

Slide 9. One of the completed wax figures is put into place. This gives the artist a chance to see the three-dimensional figure in its final setting.

Slide 10. Slide 10 pictures two figures of the scene from a somewhat different viewing angle. The foreground construction and the coloring of the terrain are shown in detail.

Slide 11. The diorama is completed. The next step is the insertion of the plate glass window.

Slide 12. The figures of the diorama shown in slide 11 and slide 12 are constructed to a scale of 1:6. The presence of the artist in slide 12 will show a size relationship between wax figures, case, and human figure.
CHAPTER VIII

SUMMARY AND CONCLUSIONS

Summary

The purpose of this investigation was to construct a diorama, to record that information on film, and to produce a slide film guide which described the process. The investigator did not always remain with tested and proven techniques of diorama construction, since the references reviewed by the investigator were on the level of the adolescent and pre-adolescent. It was the purpose and intent to develop a set of procedures which high school students or adults could use in developing a diorama.

Authorities in the education and museum fields have established the value of the diorama as a communication device. Dioramas have been used to present history to thousands of people who visit museums each year. Educators have used the device as a means by which students have investigated and constructed dioramas which have depicted scenes of the past. As a teaching device, the diorama is capable of involving every member of a class in some worthwhile task.

The writer, in establishing the theme for the diorama, reviewed numerous historical articles. The primary interest in the final selection of the subject matter was governed by the objective "simplicity is the key: communication of big ideas is the objective of dioramas." Key words and phrases were selected and underlined as being capable of producing word pictures. Several trips were made to the exact location of the historical incident, where sketches were made and photographs
were taken for later use in the studio. Word pictures, on-the-spot sketches and photographs were converted into several thumbnail sketches, from which, one was selected, enlarged, detailed, and colored.

With an accurate drawing of the diorama as a guide, the diorama case was designed. The situation demanded the construction of the diorama as a permanent section of the museum wall. As such, the problems of bracing the diorama case were simplified (note the sketch on page 10). It is the general consensus that artists and museum personnel have preferences as to the type of materials and methods used in constructing diorama cases. The materials used in the construction of the diorama case for this study were considered popular standbys (for a list of materials and procedures, refer to Chapter IV).

Upon completion of the diorama case, a wooden framework was constructed on the diorama case floor (note plate 1, page 19). This framework follows very closely the contour of the foreground illustrated in the finished sketch of the diorama. Chicken wire, cheese cloth, and plaster-of-paris, in this order, were applied over the framework. The background scenery was painted using artist's oils. The foreground was painted with tempera, which enabled the artist to place the three-dimensional figures almost immediately.

The material used to construct the figures was petroleum wax. The wax was applied to a heavy wire armature which extended through the bottom of each figure (see figure 1, page 21). This method of figure construction was chosen for the simplicity of construction.

Each major step of the process of diorama case construction
was recorded on 35 mm film and for which, a slide film guide was written (see page 23).

Conclusions

Diorama construction is an integral part in teaching and communicating ideas. The end result, education-wise, will be dependent on the amount of time spent on the investigation and construction of the diorama. Many hours of advance planning are necessary to establish the theme of diorama. From the general idea one works toward the specific in developing the desired effect to be drawn from the three-dimensional exhibit. Historical accuracy is the desired ultimate goal; however, artistic license should be used whenever the use will justify
BIBLIOGRAPHY
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August 5, 1959

Mr. Hugh G. Simons
5 Madison Court
Bozeman, Montana

Dear Mr. Simons:

Thank you for your recent letter inquiring about filmstrip production.

It is entirely possible to have 35mm transparencies in 2 x 2-inch mounts converted to single-frame filmstrip form. The Eastman Kodak Company does not offer a service of this sort, but here are several commercial laboratories which do:

The Jam Handy Organization
230 North Michigan Avenue, Chicago 1, Illinois

Society for Visual Education, Inc.
1345 West Diversey Parkway, Chicago 14, Illinois

Kling Film Productions
1416 North LaBrea, Hollywood, California

Wilding Picture Productions, Inc.
1345 Argyle Street, Chicago, Illinois

IdentiColor Laboratory
1104 Fair Oaks, South Pasadena, California

We are enclosing some general information on projection legibility and art-work standards, and on a simple device for making filmstrips, which we believe you may find helpful.

Ordinarily the advantages of filmstrips do not become apparent unless a large quantity of duplicates is needed. The initial cost of having a single filmstrip made from a set of slides, or other types of original copy, is relatively high—ordinarily ranging from $1 to $5 or $10 per frame, depending on the original material, whether it is masked for better color and contrast control, and so on. When duplicates of the original are made, these can usually be obtained for one or two sets per frame if as many as 200 or 300 duplicates are ordered at one time.

We do hope that you will find these suggestions helpful, and wish you good luck with your college work.

Yours very truly,

RS Beeler: JCB
Sales Service Division
RELATED MATERIALS

A. BOOKS


B. PERIODICALS


_____，“Eskimo Diorama," Grade Teacher, 68:36-37, January, 1951.


Flora, Sister Mary, "Diorama For Developing Skills," Instructor, 63:36, October, 1953.

Groves, J., "Decorations For Reading Tables or Window Sills," Instructor, 61:44, October, 1951.


C. FILM

APPENDIX C
RAILROAD ENDS RIVER TRAFFIC

Fort Benton always showing a hand for business, turned out with pump and ceremony for its own last boat September 19, 1887, the day the B. & M. new Great Northern railway reached that city. The Fort Benton band played bugle and booming Absolutely the captive which parted turned out in neat street gayers, and the sound of its engine roared on the silver collar in the cofi, its first box car of freight arrived from St. Paul.

Excavating for Fort Benton, sweeping the canals and laying 230 miles of track, beginning April 2, 1887, at 11:30 A.M.

Fort Benton was the true terminus of the Columbia, the Great Northern's first passenger train, which ran west from the river to the mountains.

Fort Benton was named after Captain Alexander Grant Drummond, who commanded Fort Benton on the Columbia River in 1847.

Fort Benton was established in 1847 by the United States Army and was a major military post.

Fort Benton was a stop on the Oregon Trail and served as a supply base for the Overland Stagecoaches.

Fort Benton was also a stop on the Pony Express route.

Fort Benton was a major military post during the Civil War and was used as a training ground for the 9th and 11th Montana Volunteers.

Fort Benton was decommissioned in 1893 and abandoned in 1914.