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ABSTRACT

Presented are: (1) guidelines for the selection of appropriate and feasible media; (2) criteria for production in each media format; and (3) guidelines for evaluation of each medium. This is designed for grantees or contractors who will be producing audiovisual materials for the EPA, or as part of a related activity. The level of sophistication varies. Included are "rules of thumb" for those who need only suggestions or a brief guideline prior to requesting, producing, or using any audiovisual medium. Also provided is additional detail about media selection, production standards, and suggestions for evaluation of media. (BT)

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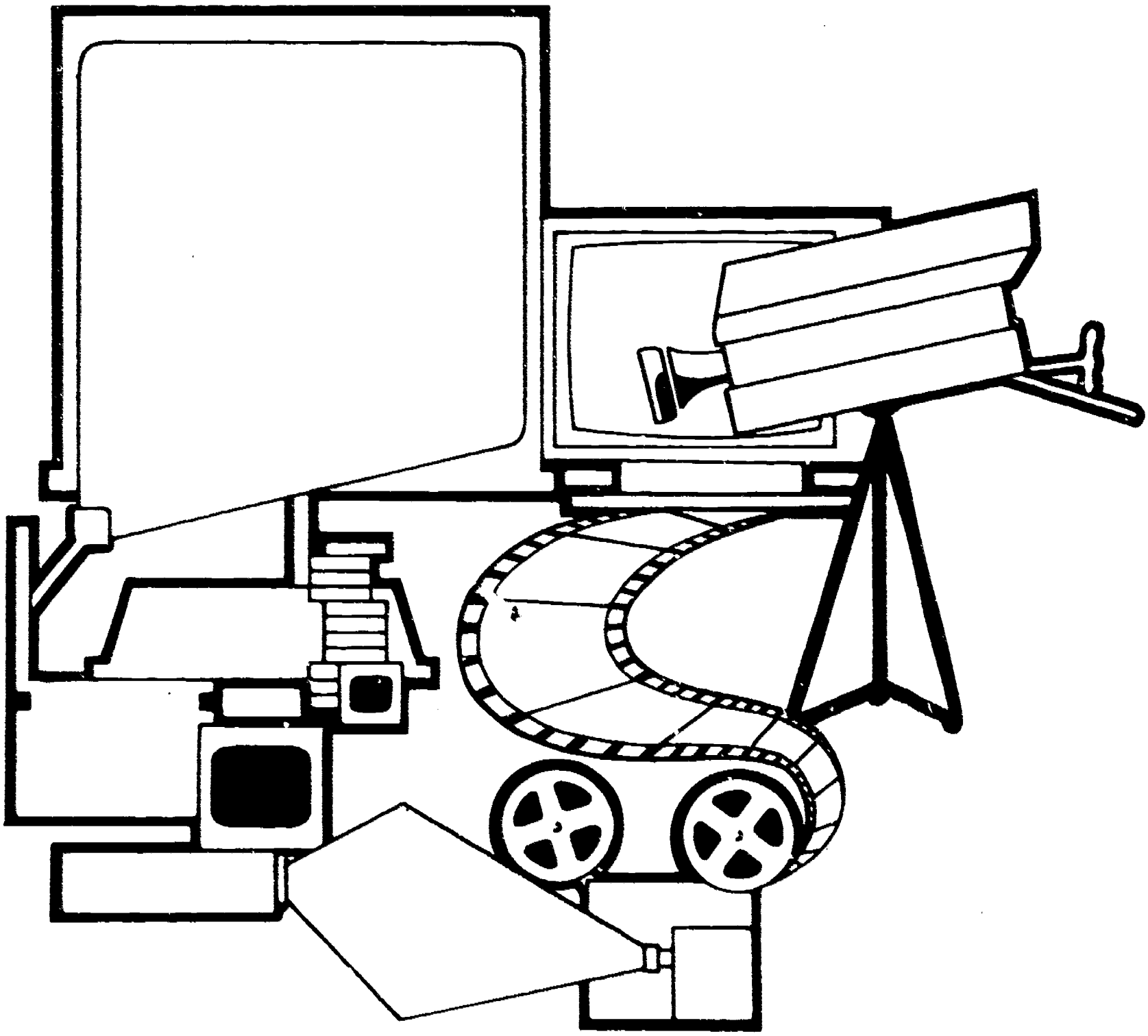
Guidelines for Media Production



GUIDELINES FOR MEDIA PRODUCTION

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FOREWORD

The importance of audiovisual media as basic communication tools is being recognized by almost every individual and organization. Whether used as an adjunct to instruction or as a basic unit of information, audiovisual media are often essential instruments in transmitting specific information from a source to a receiver or in helping to shape attitudes. In such circumstances it is imperative that the media are accurate in regard to content, acceptable in technical terms, and aesthetically pleasing. There is a certain elegance when the appropriate medium is used to communicate information in an optimum fashion at the right time and in an unobtrusive manner. The disaster of an ill-conceived medium being used in a questionable fashion is all too well known.

A concern that the correct use of audiovisual media is in the best interest of communicating information to the various publics of the U.S. Environmental Protection Agency (EPA) has caused the National Training and Operational Technology Center (NTOTC) of the EPA to establish guidelines for the selection, production and use of media in training and informational contexts. This manual provides:

1. Guidance in the *selection* of appropriate and feasible media;

2. Criteria for *production* in each media format; and

3. Guidelines for *evaluation* of each medium.

The report is designed for NTOTC staff and grantees or contractors who will be producing audiovisual material for EPA or as part of a related activity. The level of sophistication varies; it includes "rules of thumb" for those who need only suggestions or a brief guideline prior to requesting, producing or using any audiovisual medium. It also provides additional detail for those who want to know more about media selection, production standards and suggestions for evaluation of media.

Donald P. Ely

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MEDIA SELECTION

Media Selection often occurs on the basis of *availability*, *cost*, and *personal* preference. Anyone who has used a particular medium in the past and enjoyed a sense of success, is likely to use the same medium again. If an instructor knows that there is an overhead projector in the room where the class meets, it is likely that overhead transparencies will be selected. A chart or diagram on a slide or a flip chart may be the best way to present graphic information, but photo copies for each person in the group are less costly and easy to obtain at the last minute. Media selection sometimes occurs on the basis of *accessibility*, *convenience* and *reliability* regardless of the appropriateness of the material.

Users of media do not necessarily have to deny the factors of access and preference but should take a moment to consider a basic rule for media selection:

> A medium of instruction must be selected on the basis of its potential for implementing a stated objective. (Gerlach and Ely, p. 281)

In other words, consider what you want your receiver (learner, audience) to *do* when you are finished and ask yourself, "Which medium will best achieve my purpose?"

The Media Options

Fortunately, there is a variety of media from which to choose. Our technological age has brought us a range of products which permit selection based on user requirements. Consider the following:

• *Audio materials*	– Cassette and reel-to-reel audiotape, discs, radio, "live" voice
• Printed materials	– *Manuals, handouts, programmed text materials*
• *Audio/print materials*	– Tapes (and other audio media) combined with printed materials
• *Projected still, visual materials with audio*	– Filmstrips, slides, transparencies
• *Motion, visual materials with audio*	– *Sound motion pictures, videotape,* videodisc, television
• Real *objects*	– *Actual objects, models, mock-ups*
• Human and environmental *resources*	– *Role playing, simulations, games* field trips

The Basic Steps of Media Selection

Research tells us that no single medium is likely to have properties that make it best for all purposes. Therefore, we have to select a medium on other bases than availability, cost, and personal preference. The list of media above offers a range of possibilities.

There are many media selection procedures (Bretz, 1971, Goodman, 1971, Kemp, 1971) and each one suggests similar steps:

1.	State the objective (in behavioral terms):	What will the learner *do* at the end of the instruction?
2.	Determine the classification of the behavior (cognitive, affective, psychomotor):	Will the activity involve the recall and application of information (cognitive), the expression of feelings or values (affective), or body movement (psychomotor)?
3.	Select a teaching/learning strategy which will help the learner achieve the objective: and	What procedures will be followed to present the information, attitude or skill and to practice it?
4.	Select the medium.	What means of presentation will offer the greatest potential for learning?

Here is an *example*. Following these steps, an objective might be "to identify types of aeration devices, given pictures of various types of aeration devices". The objective is cognitive (having to do with factual information), not affective (dealing with feelings, emotions) nor psychomotor (movement of the body). The teaching/learning strategy is to present photographs of four types of aeration devices to a group of learners. The selection of a medium calls for a projected, still image in color. Movement is not necessary and since the narration will be supplied by the instructor, no recorded audio material will be necessary. Options available include slides, filmstrips, or printed photographs. A field trip to actual sites where such devices are used has already been rejected because of time and cost. Equipment is available for slides and filmstrips. No printed photogaphs are available and it would be very expensive to print such photographs in color for a relatively small number of learners. So, by considering appropriateness of the medium, such practical matters as availability of necessary equipment, and cost factors, the decision to use *slides* is made.

Basic Procedures

One media selection procedure which incorporates the elements of most models as well as practical factors was developed in 1974 by Durham, Gerheart, and Austin for EPA: *Selecting Instructional Media and Instructional Systems*. The steps developed for that publication are reproduced here with some minor modifications. The table which helps to determine cost and content suitability for each medium is an essential part of the selection process. These two selection tools can be used with a high degree of assurance that the "right" medium is being selected if all factors are considered in making the decision.

TABLE 1

MEDIA COSTS AND CONTENT SUITABILITIES

MEDIA	PRODUCTION COSTS	DUPLICATION COSTS	TYPE OF AUDIENCE	SUITABLE CONTENT			SENSES USED
				Cognitive	Affective	Psychomotor	
Printed Materials	very low	very low	individual	Excellent	Fair	Good	Sight
Lecture	low	high	group	Fair	Good	Poor	Sight-Hearing
Audio-Tape	low	low	group or individual	Poor	Fair	Poor	Hearing
Slides	low	low	group or individual	Good	Good	Good	Sight
Overhead trans-parency	mod. low	low	group	Good	Fair	Fair	Sight-Hearing
Slides/ tape	mod. low	low	group or individual	Good	Good	Excellent	Sight-Hearing
Television	high	mod. low	group or individual	Fair	Excellent	Excellent	Sight-Hearing
Motion Pictures	very high	mod. low	group or individual	Fair	Excellent	Excellent	Sight-Hearing
Simulation	very high	very high	individual	Good	Good	Excellent	Sight-Hearing Smell-Touch Body movement

STEPS IN SELECTING THE APPROPRIATE MEDIA FOR TRAINING*

1. State the new behavior (activity, performance) the student is to exhibit after the presentation.

2. Classify this new behavior: (a) cognitive (having to do with factual information), (b) affective (dealing with feelings, emotions), (c) psychomotor (body movement). (If the new behavior involves combinations of these types of behavior, rank them in order of importance.)

3. Referring to Table 1, select the media which indicate greatest suitability (good to excellent) for this type of learning. List them in order of production costs with lowest cost first.

4. State which of the senses the student uses to exhibit this new behavior. (If more than one sense is involved, rank them in order of importance.)

5. Indicate the media in Step 3 which are lowest in cost and, where possible, which present information through the same senses the student will use when exhibiting the new behavior.

6. Select the medium from those listed in Step 5 which you can use most easily with your presentation facilities.

7. Is this medium suited for the kind(s) of presentation mode(s) for which this learning is designed? If not, select the next medium which meets this requirement, is lowest in cost, and is most easily available.

*A worksheet which incorporates these steps and an example of their use is reproduced on pp. 5 and 6. A separate worksheet should be used for each objective.

WORKSHEET FOR SELECTING MEDIA

1. New behavior:

2. Classification of new behavior: (If more than one type of learning is involved, rank them in order of importance.)

   Cognitive (factual information) _____

   Affective (values, feelings, emotions) _____

   Psychomotor (body movement) _____

3. Media suitable for this type of learning (from Table 1):

4. Sense used to exhibit new behavior: (if more than one sense is involved, rank them in order or importance.)

   Sight _____

   Hearing _____

   Smell _____

   Touch _____

   Body movement _____

5. Cost of medium (Table 1): Presentation through same sense as exhibited behavior, in No. 4

6. Medium most easily produced and used locally:

7. Recommended medium for:

   Group presentation

   Individual use

EXAMPLE
WORKSHOP FOR SELECTING MEDIA

1. New behavior:

   Given illustrations of four aeration devices, the learner will identify each device and describe its functions.

2. Classification of new behavior: (If more than one type of learning is involved, rank them in order of importance.)

   Cognitive (factual information) ✓

   Affective (values, feelings, emotions) _____

   Psychomotor (body movement) _____

3. Media suitable for this type of learning (from Table 1):

   printed materials, overhead transparencies, slides

4. Sense used to exhibit new behavior: (If more than one sense is involved, rank them in order or importance.)

   Sight ✓

   Hearing _____

   Smell _____

   Touch _____

   Body movement _____

5. Cost of medium (Table 1): Presentation through same sense as exhibited behavior, in No. 4

   printed materials – very low
   slides – low
   overhead transparencies – moderately low

6. Medium most easily produced and used locally:

   printed materials and slides

7. Suitable for presentation modes:

   Group presentation: *slides*

   Individual use: *printed materials*

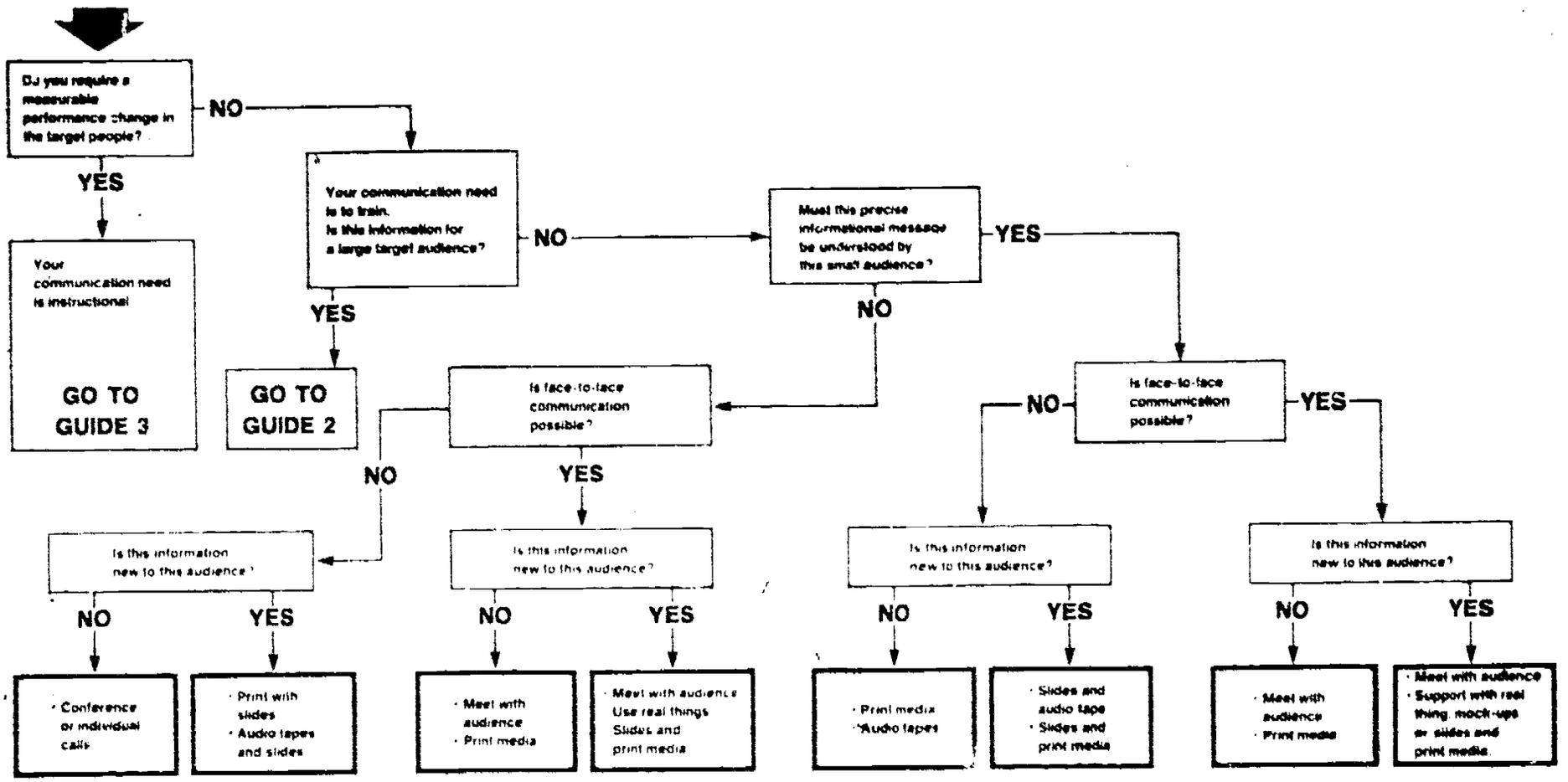
An Alternative Selection Procedure

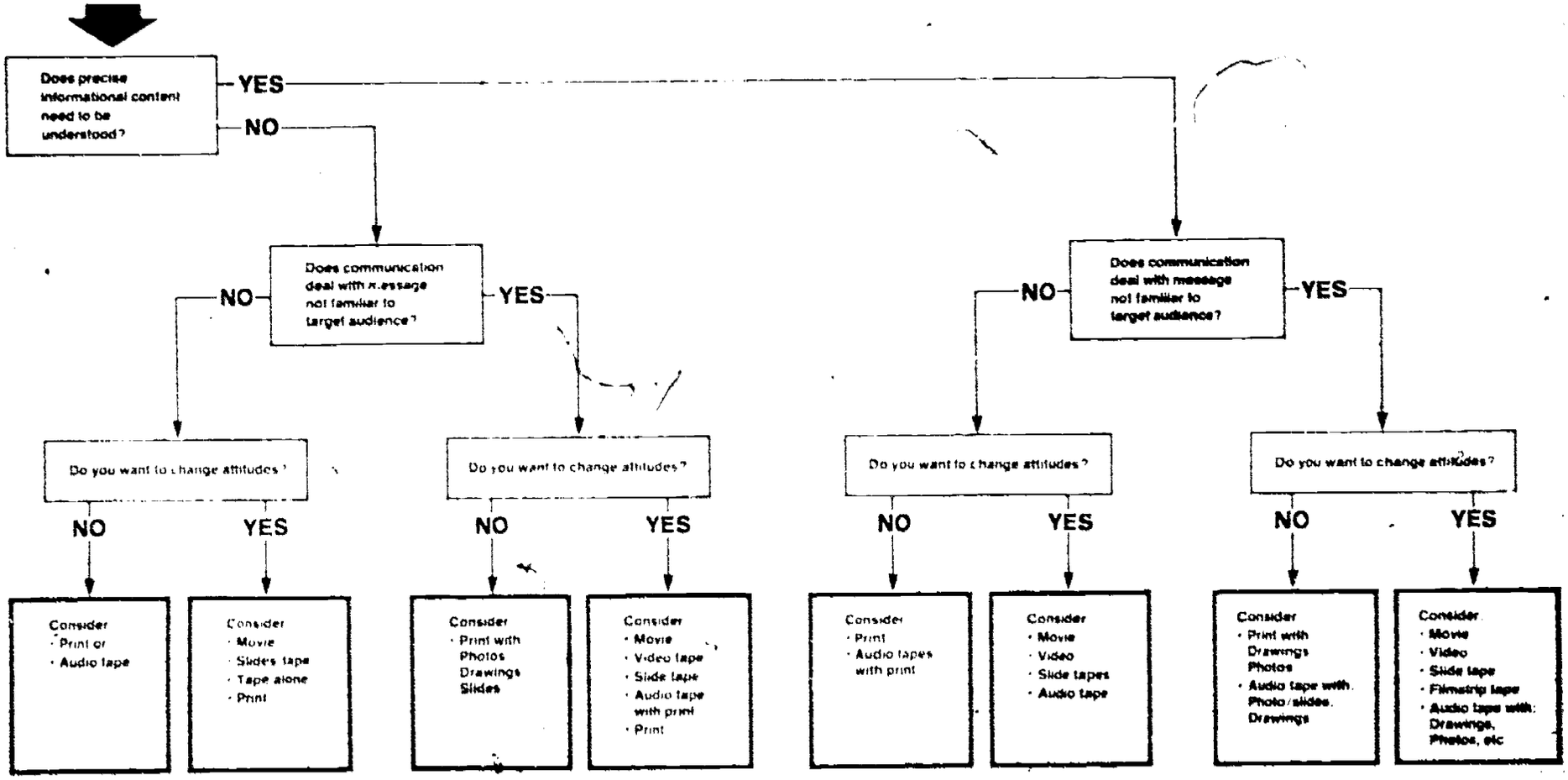
For some people a flow chart with its "yes" and "no" decisions is an easier way to select media. The flow charts which follow (Anderson, 1976) incorporate the basic principles of the Durham, Gearheart, and Austin procedure just described. Just as in all media selection procedures, the *first step* is to state what the individual should be able to do at the end of the presentation.

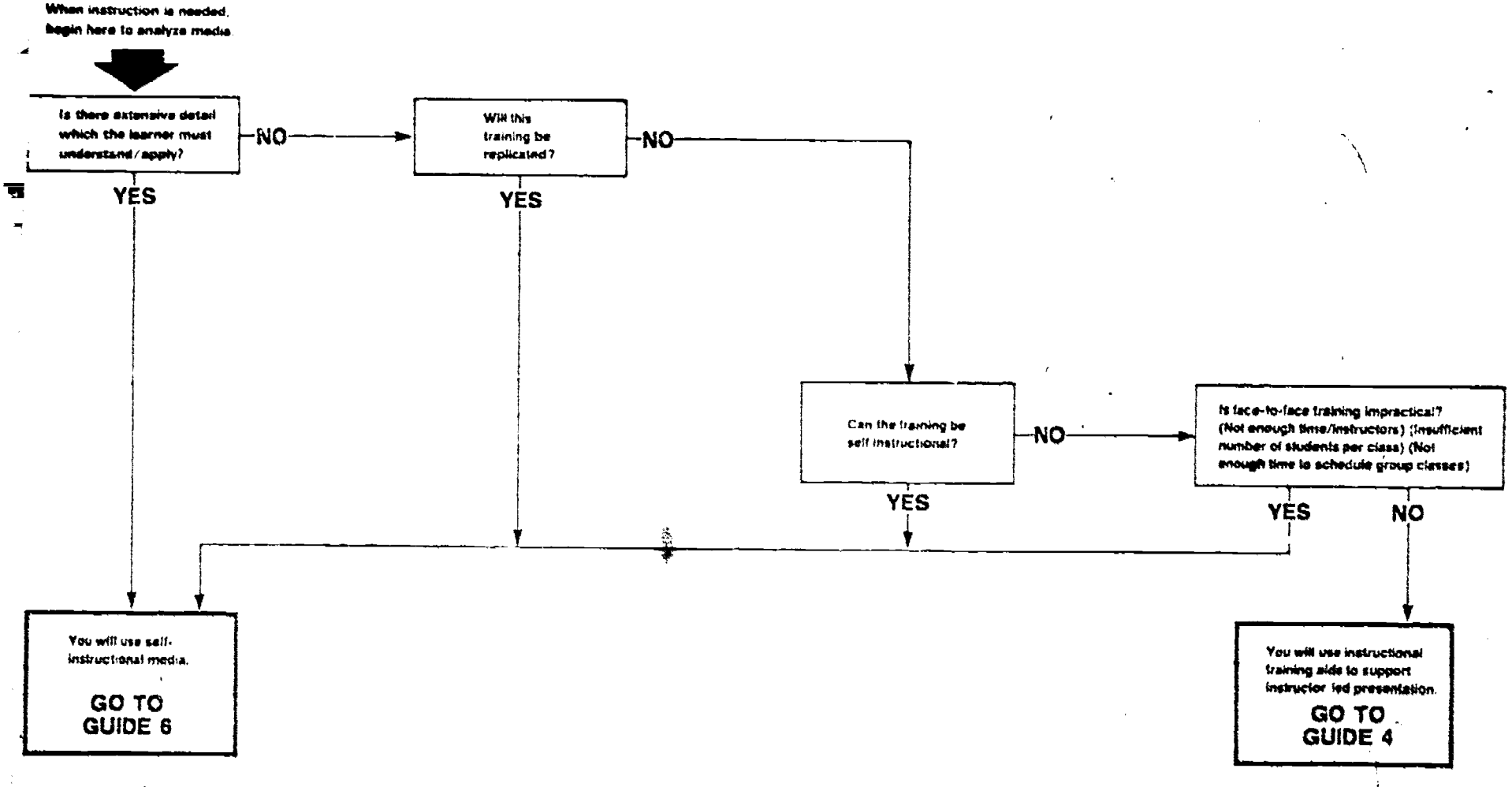
There are 7 guides which are intended to be used in sequence. The initial question on each guide will lead the user through a sequence or refer to another guide.

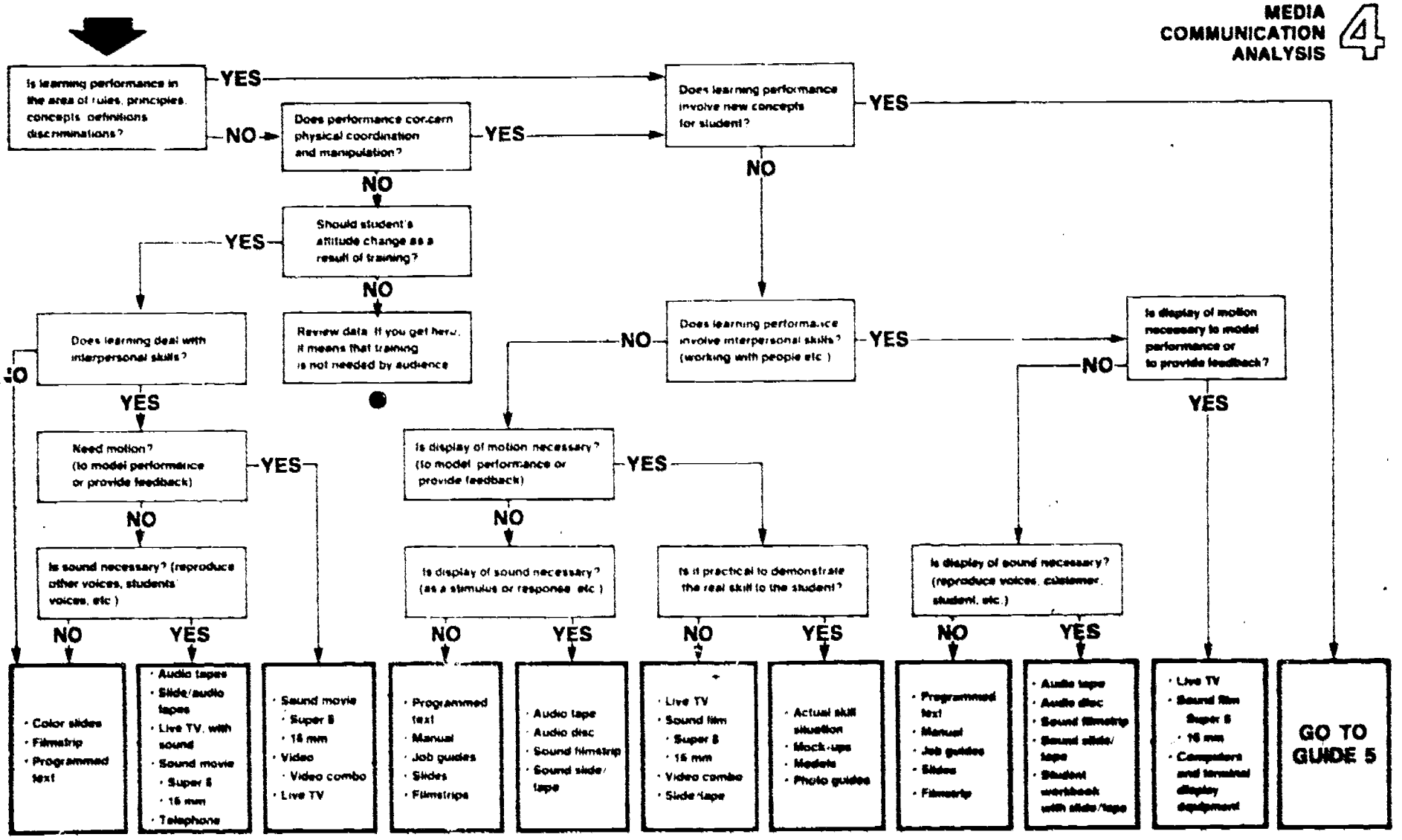
> Begin by stating an objective (what the person who is receiving the information should be able to do at the end of the presentation).
>
> Then, go to Guide I and answer "yes" or "no" to the question, "Do you require a measurable change in the target people?"
>
> From that point on, a "yes" or "no" response is required at each step along the way.
>
> The end product will be a list of media options which you should consider.
>
> First selection may depend upon local factors such as cost and availability.

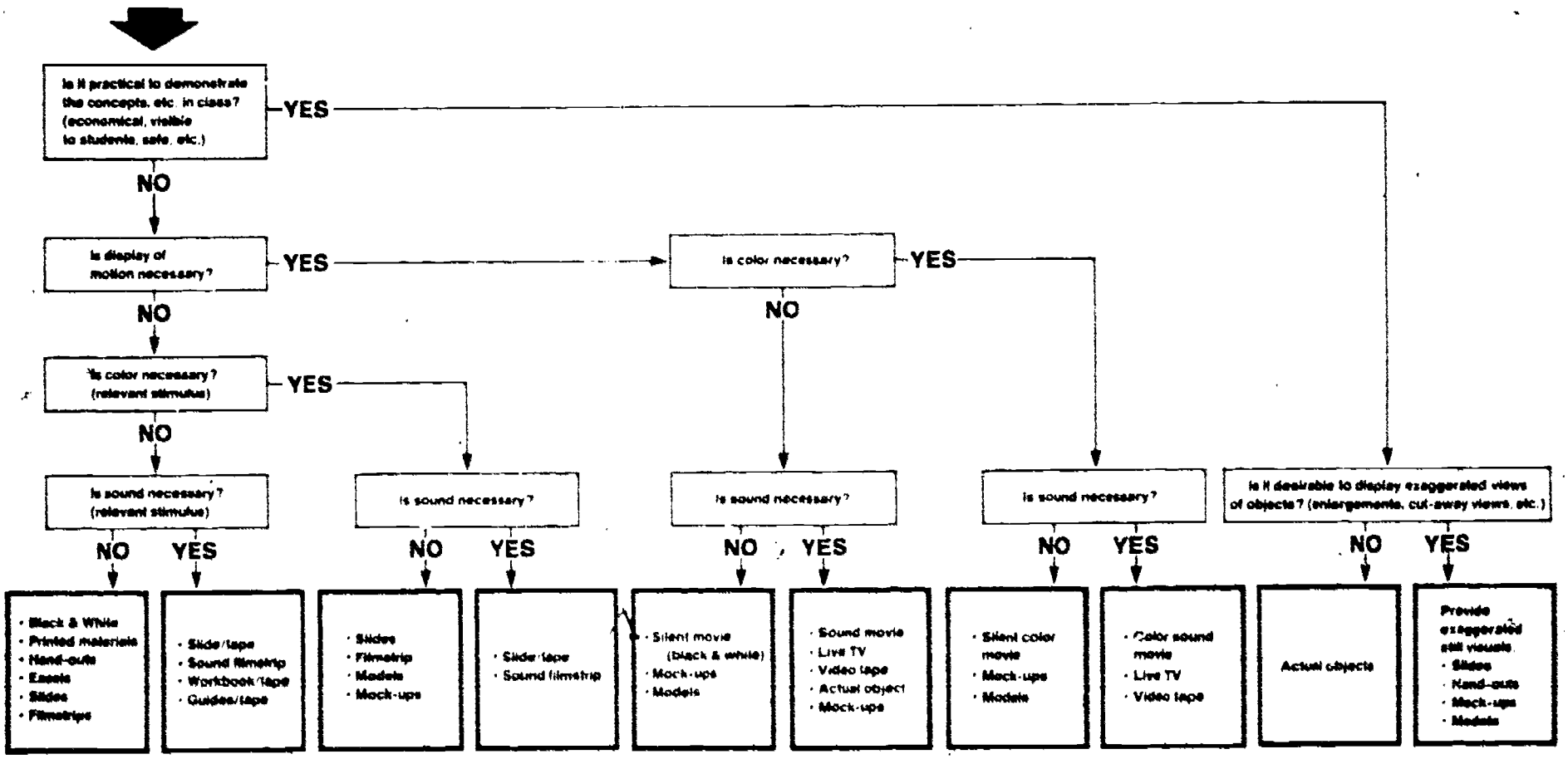
Try to go through the guides on the next seven pages. Write an objective and proceed through the guides step-by-step.

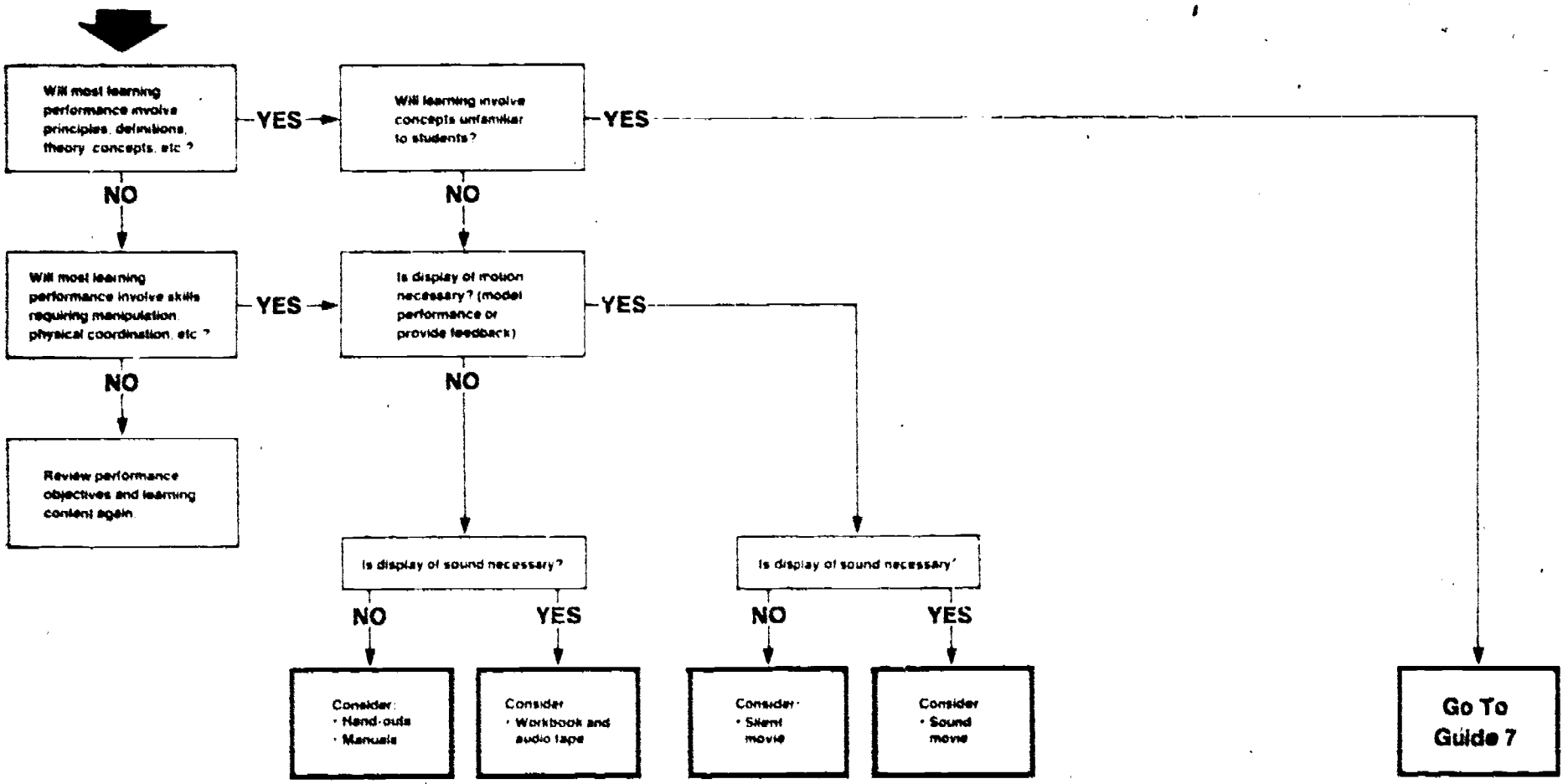


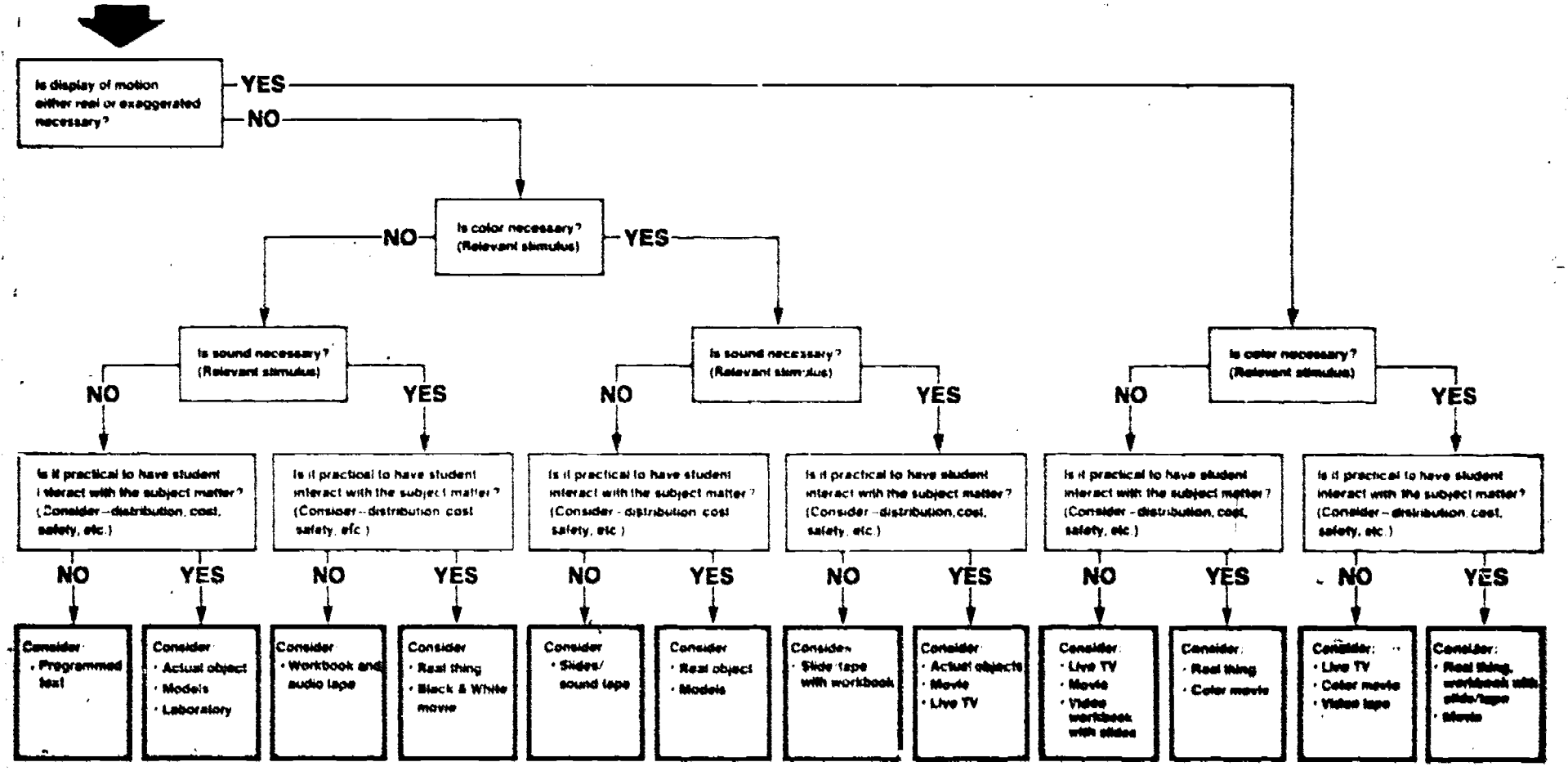












Adapted from Selecting and Developing Media for Instruction by Ronald H. Anderson, co-published by American Society for Training and Development and Van Nostrand Reinhold Company, New York. Copyright 1976 by the American Society for Training and Development. Produced with permission of copyright owner.

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Kemp, Jerrold E. "Which Medium?" *Audiovisual Instruction.* December 1971.

GUIDELINES FOR MEDIA PRODUCTION

Currently there are no national standards for audiovisual products. Some organizations and agencies, such as the Department of the Army, establish specifications for their own use on a national basis. The most frequently used sources for *guidelines* (not standards) are: the Association for Educational Communications and .echnology (AECT) – the association for practicing professionals; the National Audio Visual Association (NAVA) – the association of dealers and producers; and the Eastman Kodak Co. The American National Standards Institute (ANSI) sets standards for raw stock materials for production, e.g., the size of film and the location of quadraphonic tracks on audiotape.

The recommendations whic' rollow are taken from all of the sources mentioned above except ANSI. The guidelines offered here are digests of more sophisticated and technical specifications.

Production Planning

Prior to actual production of any medium, there should be (1) a treatment and (2) a storyboard and/or script. In some cases, these planning guides may be requested by project managers prior to production.

A *treatment* is a written narrative which describes the approach to the product being produced. It should be sufficiently detailed to cummunicate the purpose of the material the intended audience, and the sequence of events. It is a summary of the content and approach which will be followed to attain the purpose for the defined audience.

A *storyboard* is a visual display of illustrations and written narration arranged in appropriate sequence. Instruction to the photographer, artist, narrator and/or audio engineer are usually included. Figures 1 and 2 show storyboard cards which may be used or adapted for productions.

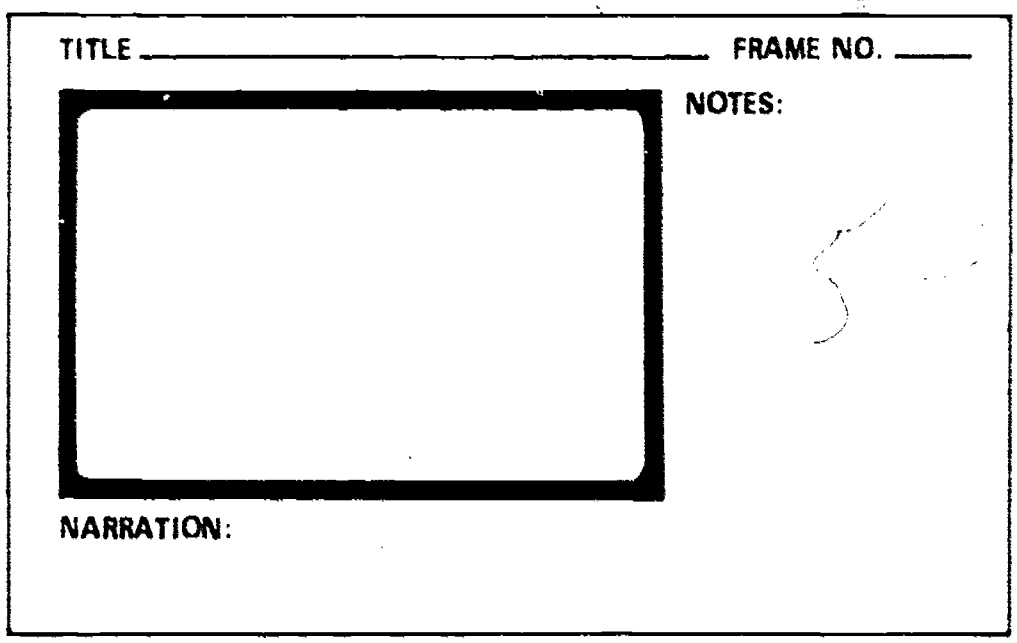


Figure 1. Single Storyboard Card

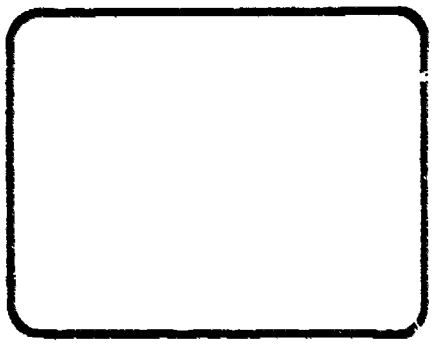
STORYBOARD FORM

SUBJECT _____ INSTRUCTOR _____

PURPOSE

SCRIPT

_____



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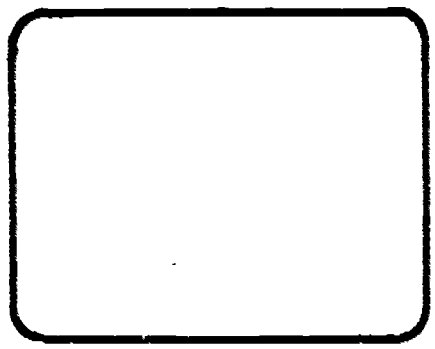


_____

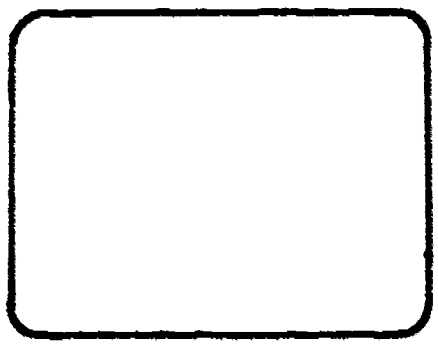


Figure 2. Storyboard Script Form

A *script* is a written manuscript which contains a description of visual images and the audio which is to be heard as the images are seen. Scripts usually number the frame or sequence and provide cumulative time information. Figures 3 and 4 are examples of acceptable script formats.

Content of scripts should contain the following elements where appropriate:

1. An appropriate introduction with a statement of purpose;
2. Clear transitional narrative and visual statements within the material;
3. Arrangement and juxtaposition of each event in an effective manner;
4. Adequate emphasis of important points;
5. Vocabulary level which is appropriate to the comprehension level of the target audience;
6. Explanation of technical terms and abbreviations when necessary to enable viewer understanding;
7. Proper nomenclature for the tools and equipment used;
8. Complete and accurate reference to related materials;
9. Technically accurate information with a minimum of irrelevant and disruptive information;
10. Rate of presentation (pacing) and length which is appropriate to the target audience and the complexity of the subject matter; and
11. Generation and maintenance of viewer interest.

Title: THE SYSTEM APPROACH Page 1 of 44

No.	Visual	Audio	Cum. Time
1	Title: THE SYSTEM APPROACH	Musical Introduction	0:00
2	Mary descends steps from school building	Music continues	0:09
3	Mary walks by fence	Music	0:23
4	Mary enters car	Music	0:41
5	Cars move along street	Music	1:01
6	Mary leaves car	Music	1:25
7	Mary waits at museum door	Music	1:51
8	Mary waves from steps of museum	Mary: Hey George, here I am, over here.	2:22
9	George and Mary in front of museum	George: Hey, why the museum? Mary: Well, I just thought that since we were going out for a cup of coffee, uh, you could stop by the museum...	2:30
10	George and Mary enter door of museum	Mary: with me while I do a little homework. George: You're going to take the kids on a field trip.	2:45

Figure 3. Sample Script Format

DETERMINATION OF TOTAL RESIDUAL CHLORINE
IODOMETRIC TITRATION METHOD

PAGE 1

TITLE _____ AUTHOR C. R. Feldmann CODE XT-93

NARRATOR C.R. Feldmann DATE 1/77 TIME _____

1	EPA Symbol	Instructions to operator: Advance manually to slide number 1. Music.
2	Iodometric Determination of Total Residual Chlorine U.S. Environmental Protection Agency Water Programs Operations National Trainingand Operational Technology Center.	Beginning of script: This instructional unit on the Iodometric Determination of Total Residual Chlorine was prepared by the U.S. Environmental Protection Agency, Office of Water Program Operations, National Trainingand Operational Technology Center.
3	.Reason for Chlorination .Chemicals used .Effect on pH .Species produced	In this presentation you will see: the main reason for chlorinating wastewater treatment plant effluents, what chemicals are used for chlorination, their effects on the pH of the effluent, chemical species produced by the materials used for chlorination,

Figure 4. Script Example for Slide/Tape Production

Visual Formats and Legibility

One of the basic concepts in designing visual materials is ratio. The specific ratios for each major format are shown in Figure 5. The ratios are translated into numerical sizes in each section which follows.

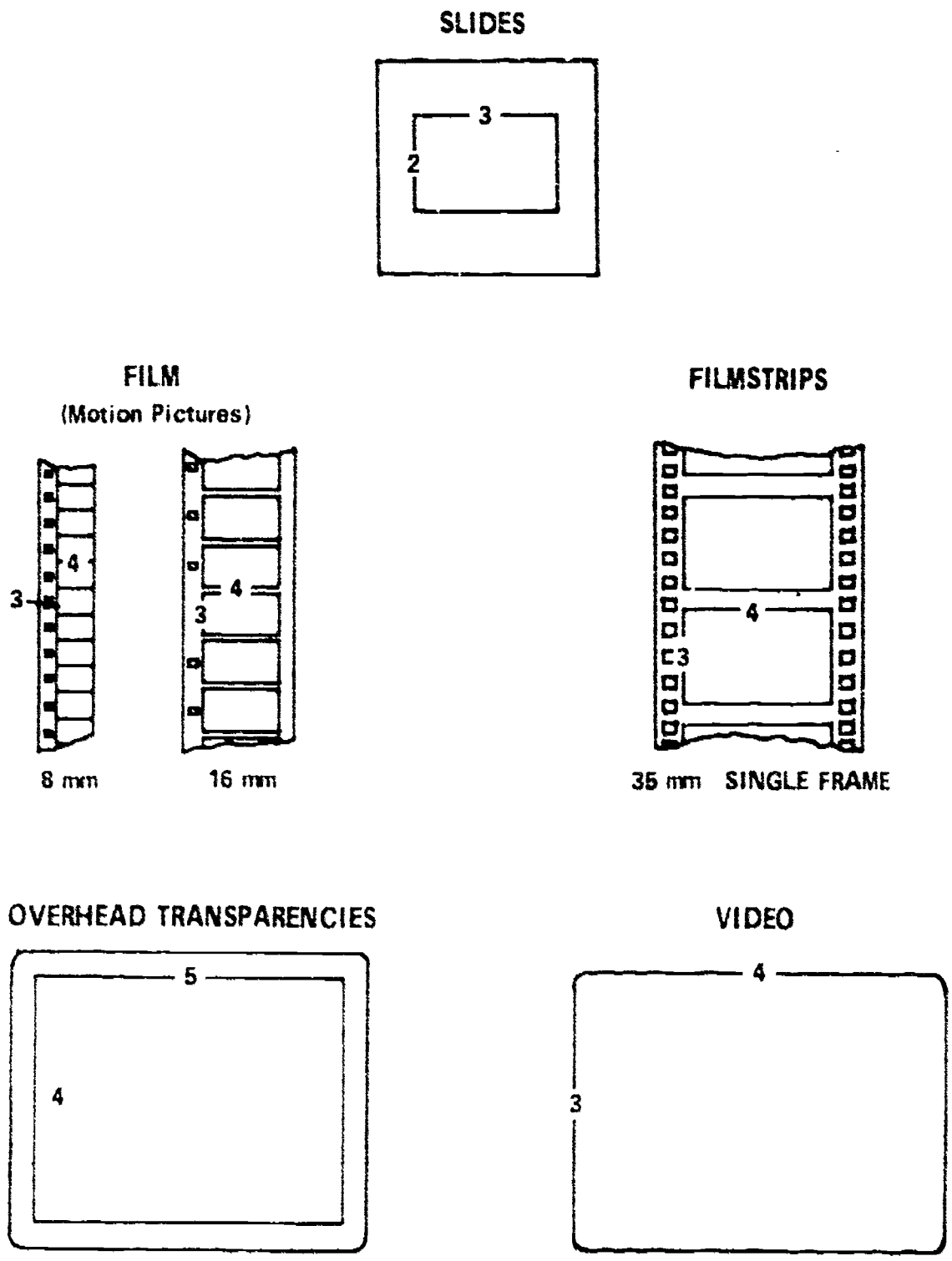
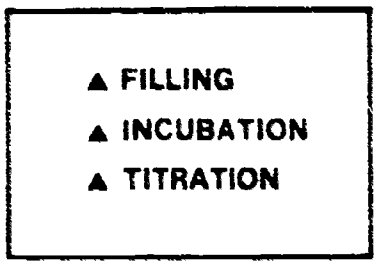
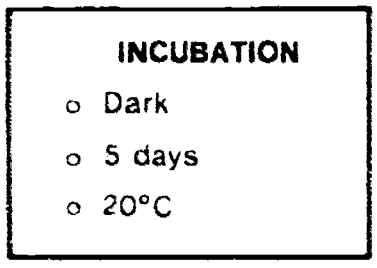
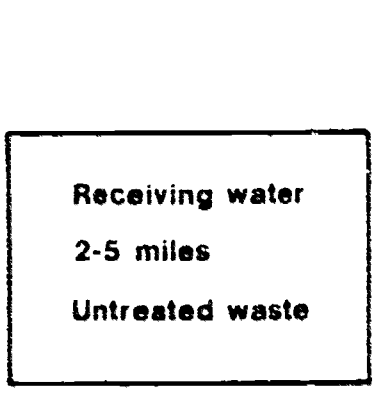


Figure 5. Visual Format Ratios

Closely related to the format is legibility of projected visual materials. The advice regarding legibility from Eastman Kodak Co. is generally accepted or adapted for local purposes.







General guidelines for legibility are as follows:

1. Select a readable type style: avoid fancy lettering: letters should be bold and simple. (Figure 6)

2. Use capital letters for short titles and labels, making them larger than those in other words. (Figure 6)

3. Allow 1 1/2 letter width forspace *between words* and 3 widths *between sentences*. Space letters *optically* to make them appear equal regardless of measurement. (Figure 6)

4. When using color film create a contrast between letters and background, using contrasting colors, tones, and textures.

5. Use a letter size based on the maximum anticipated viewing distance. The usual standard is *8 times the horizontal* dimension of the picture on the screen (8W). For a 6 foot screen to be completely filled with an image, the maxiumum viewing distance is 48 feet (6 x 8W). Since the maximum viewing distance for television is 12W, therefore the minimum letter size is greater. Minimum lettersizes are indicated in Figure 7. The sizes are just *minimum*. Larger or bolder letters are often better and can provide greater impact and emphasis.

Figure 6. Guidelines for Legibility

It is fallacy to believe that a large transparency improves legibility. The size of the transparency is *not* the determining factor; it is the size of the detail on the *screen* that is significant. For example, if letters on a 6 foot wide projected image are to be legible at 48 feet (8W), they must be at least 1 1/2 inches high on the screen regardless of the medium which is used — slides, motion pictures, films or overhead projection. To obtain a projected letter of that height, a minimum letter height for 6" x 9" art work would be 1/8", but a larger size would be preferred.

Medium	Maximum Viewing Distance	Ratio of Letter Height to Height of Art Work Area	Minimum Letter Height for 6" x 9" Art Work Area
Slides Filmstrips Overhead transparencies Motion Pictures	8W	1 : 50	.125"
Television	12W	1 : 25	.25"

Adapted from Legibility: Art Work to Screen, pamphlet 5 - 24 (Eastman Kodak Co., Rochester, New York)

Figure 7. Minimum Letter Sizes for Maximum Viewing Distances of A/V Materials

In using the image width concept, remember that if projected material is to be legible for the farthest viewer, who is seated 8 times the image width from the screen, it will be legible for all members of the audience with average vision. Therefore, this maximum viewing distance (expressed as 8W) can be used in determining the minimum size of letters and symbols to be projected.

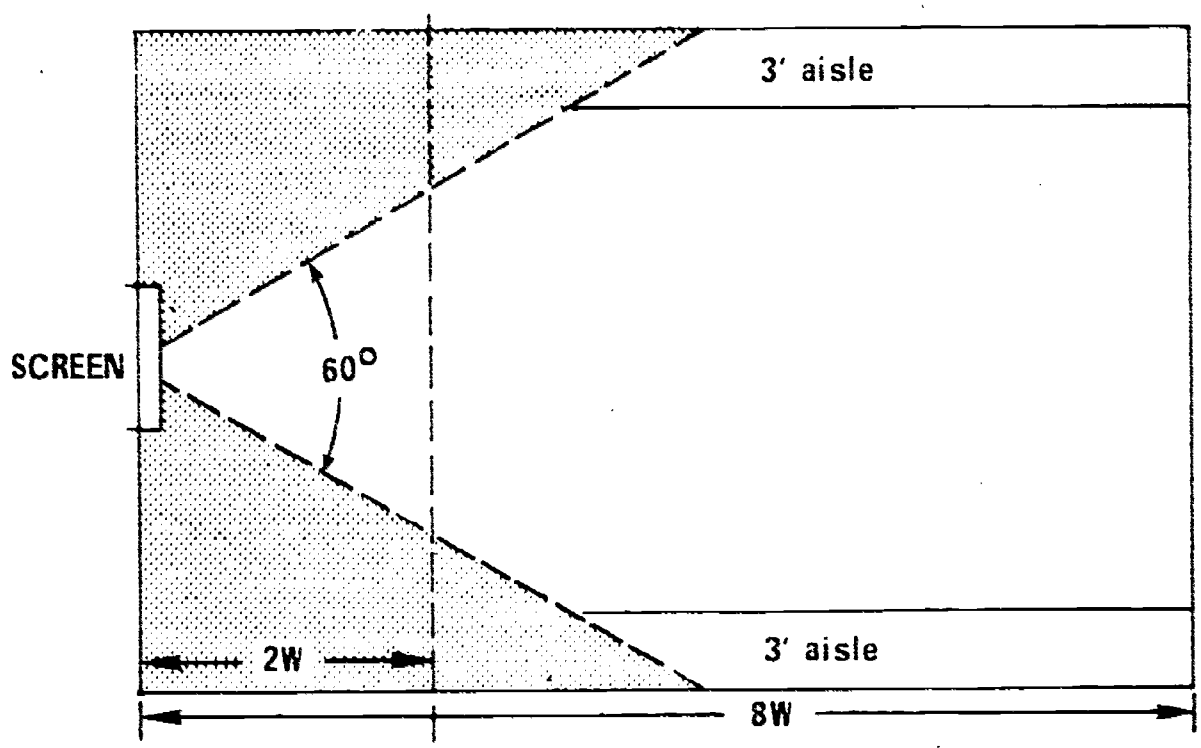


Figure 8. Suggested Seating for Screen Legibility (with glass beaded screen)

*For maximum legibility viewers should be seated within the white area. Viewers should *not* be seated closer to the screen than two times, nor farther than eight times the width of the screen.

The bottom of the screen should be*at least* four feet above the floor to avoid obstructing the viewing of the viewers at the back of the room. When a room is arranged for theater style seating, aisles should be placed at the sides and back of the room to maximize viewing area.

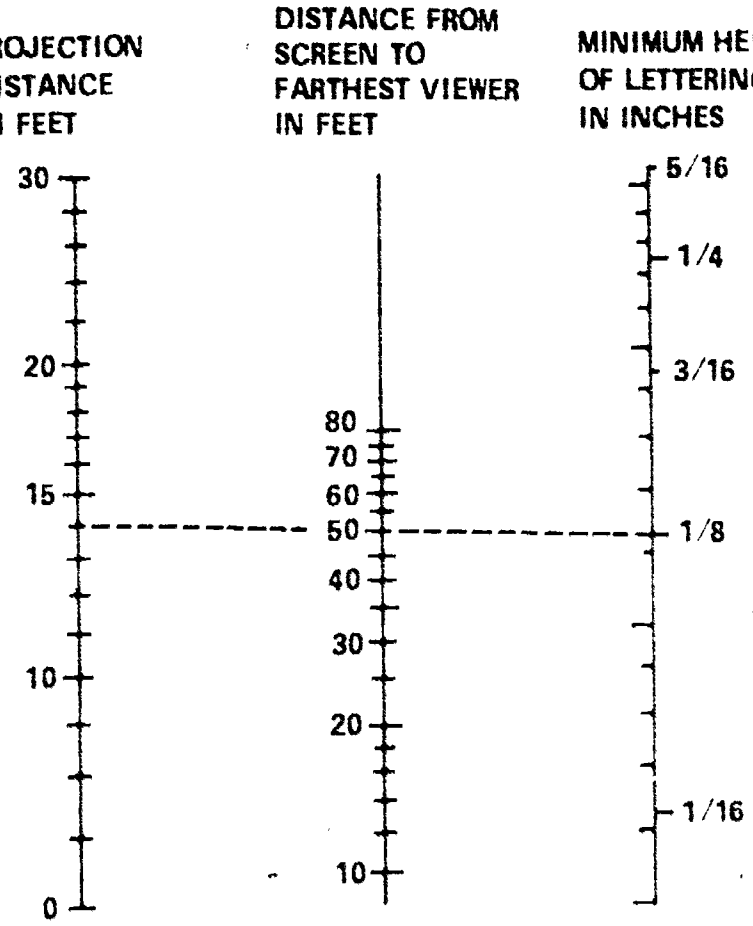
The recommendations for legibility are guidelines and not absolute rules. Special situations such as seating arrangements, rear screen projection, ambient light and equipment used may require larger images or bolder lettering to insure legibility.

Overhead Transparencies

The area of the projection stage of an overhead projector is 10" x 10". The entire area may be used for a transparency. but is better to avoid the extreme edges. It has become accepted practice to prepare transparencies using a 4 x 5 height to width ratio. The standard transparency size is 8 1/2" x 11" of which 7 1/2" x 9 1/2" is within the safe viewing area.

Legibility standards are particularly critical for letters and symbols. Although typewriting is discouraged, primary typewriter lettering is often large enough but looks rather "ragged" when projected. A good "rule of thumb" for print size to be projected in average rooms (farthest viewer is about 30 ft. from the screen) is no less than 1/4". Figure 9 offers useful guidelines for various projection conditions. *In no case should the specified minimum size be construed as a restriction on the use of larger sizes.*

The best copies of overhead transparencies are usually made from the original artwork. Therefore, these materials (masters), along with one set of transparencies may be requested by the project manager. Transparencies should be produced on 8-1/2 x 11 inch firm acetate stock and mounted on standard 10 x 12 inch cardboard mounts.



EXAMPLE

Given: Projection Distance, 14 Feet
Distance from Screen to Farthest Viewer, 50 Feet

Find: Minimum Height of Lettering .125, or 1/8

Figure 9. Minimum Height of Lettering for the 10" × 10" Overhead Projector

Slides

Slides will use a 35mm format (2 x 2 inch slide mounts; 22.9mm x 34.2mm aperture dimensions). Any slide set should use *only this size* throughout and follow a *horizontal format*. Other general guidelines for slide presentations are as follows:

1. Use color film for all slides.

2. Limit each slide to one main idea.

3. Use progressive disclosure (building up an idea point-by-point using additional information in each successive slide until the visual is complete). (Figure 10)

4. Limit each slide to 15–20 words and include no more than will be discussed. (Figure 10)

5. Leave space between lines (at least the size of a capital letter). (Figure 10)

6. Use several simple slides rather than one complex slide. (Figure 10)

7. Use duplicate slides to refer to the same idea at different points in the presentation.

Technical guidelines are as follows:

8. Base the minimum artwork letter size on the maximum viewing distance. The minimum height for all letters, words, or phrases which will appear in the final art should be in the ratio of 1:50 of letter height to height of final projected area. The minimum lower case letter height should be 1/8" on 6" x 9" artwork, but 1/4" would be better.

9. Services should include all labor and materials necessary for the development of artwork suitable for reproduction of 2 x 2-inch slide transparencies utilizing a 3 x 4 aspect ratio with all critical information contained within the standard TV "safe area" for the visual material. The "safe area" is a space smaller than the TV picture tube which is sure to be seen on a commercial TV receiver. In other words, the extreme edges of almost any graphic material will probably not be seen on the receiver and all art work for TV must take this factor into account.

10. Number slide mounts in sequential order of their appearance. The slide sequence number should appear on each slide mount along the upper edge (to be viewed by the projectionist), when the slide is inserted into a slide tray for projection.

11. Mount slides in 35mm double frames, plain thin cardboard mounts. The mounts should provide for positive locking to prevent them from coming apart during handling, shipping, and/or storage.

12. Submit two sets of slides; one original and one controlled contrast reproducible. (A color internegative is also acceptable as a second copy.)

1

DESCRIBE CLARIFIER APPEARANCE

READ DEPTH OF BLANKET

4

DESCRIBE CLARIFIER APPEARANCE

READ DEPTH OF BLANKET

CLEAR OR TURBID

BULKY OR STRAGGLER FLOC

ASH AND DENITRIFICATION

2

DESCRIBE CLARIFIER APPEARANCE

READ DEPTH OF BLANKET

CLEAR OR TURBID

5

DESCRIBE CLARIFIER APPEARANCE

READ DEPTH OF BLANKET

CLEAR OR TURBID

BULKY OR STRAGGLER FLOC

ASH AND DENITRIFICATION

3

DESCRIBE CLARIFIER APPEARANCE

READ DEPTH OF BLANKET

CLEAR OR TURBID

BULKY OR STRAGGLER FLOC

Figure 10. Progressive Disclosure.

Filmstrips

Filmstrips are usually requested when a large quantity of prints are required. A 35 mm color internegative master and trial print should be submitted. All artwork and photographs must use a *horizontal* format.

The filmstrip ratio is 3 x 4 (Figure 5) and therefore care needs to be taken when converting the 35 mm double frame (slide) format (which is 2 x 3) to the 35 mm single frame filmstrip format.

The general guidelines for slide presentation should be followed for filmstrips.

Guidelines for filmstrips are as follows:

1. If captions are used, limit the number of words to two lines.

2. Test the material in slide format prior to committing it to filmstrip format.

3. If sound is to be used, an audiocassette should be used with automatic advance cues (50Hz) on one track and audible cues on a second track.

Motion Pictures and Television

Several rules of thumb should be applied in preparing any instructional motion picture (or television) material:

1. These media are designed to show *motion*, not still pictures.

2. Regardless of audience size, the script should be aimed at the individual learner (viewer).

3. The sound track must be directly related to the visual elements and should be in the active voice.

4. The narration should *not* tell what is on the screen unless interpretation or clarification is necessary or a critical point must be stressed.

5. The script should offer a logical flow of *visual* information.

All motion pictures should be submitted in 16 mm format regardless of plans for release in 8 mm or 16 mm. If more than ten prints will be required a master internegative is required.

1. The film should be free of physical defects such as scratches, pinholes, dust streaks, spots, fingerprints, pulled or torn perforations, and/or edge abrasions and should be properly framed and registered.

2. Artwork prepared for motion pictures needs to meet the same standards as for other media. Film graphics are based on the 6W formula and the film format is a horizontal 3 to 4 ratio.

The "rules of thumb" for the motion materials also apply to television products. However, the smaller screen size requires a somewhat different standard for artwork.

To determine the size of the image in relation to distance, the *12W* formula should be used. (One foot of screen width is required for each 12 feet of viewing distance from the screen.) This is different from other projected visuals. Since legibility standards for television are different from those for projected media, and since visuals originally made for other media must often be used for television productions, the problems that can arise should be anticipated at the outset of production planning. For example, 35 mm slides that have been designed for projection according to the *6W* formula probably should be redone for satisfactory presentation on television. Also, the 35 mm slide format uses a 2:3 ratio while television uses 3:4.

The problem which plagues the video world is lack of standardization for videotape and videocassette. One master size has been adopted by NTOTC, the 3/4" U-matic video cassette.

Other recommendations for preparation of visual materials for television should be considered:

1. Contrast in visuals should be clear but not extreme. Avoid large areas of white since the TV camera picks up strong light reflections which cause glitter and flare.

2. Keep details in graphics and slides simple and bold. If a visual is "busy" or includes too much material, it will be distracting to viewers. Irregular lines are accentuated on close-ups and unevenness of lines and lettering is enlarged on the TV screen.

3. Photographs should have good contract, proper focus and good resolution since any original defects will be enlarged on a TV screen.

Audiotape

Most audio materials are intended to accompany slide presentations. However, there may be need for audio materials alone from time to time. The guidelines and recommendations which follow apply to both cases.

In any audio material, the basic unit is a master tape from which copies are made. When producing a master tape the following procedures should be followed:

1. Masters should be produced on high quality open reel tape at minimum of 7 1/2"/sec. One master audiocassette should be submitted on high quality ferris oxide stock.

2. When producing audio tapes with cue tones for slides, the master should be made on a two channel format. The voice is recorded on Tracks 1 and 2 and the cue signed on Tracks 3 and 4 for flexibility in reproduction editing.

3. Inaudible cue signals should be 1 kHz for "advance" and 150 Hz for "stop" signals.

4. Home recorded or "pirated" music cannot be used. Select music and sound effects from a studio library or purchase "cleared" stock music and sound.

5. Audio Leader. Each audio tape cassette should have not less than three nor more than six seconds of "dead" tape or leader at the lead end prior to sound start. A "beep" cue should be given 2 sec. before narration or music begins.

References

Association for Educational Communications and Technology, *The Messege is You.* Washington, DC: AECT, 1971.

Anderson, Ronald H., *Selecting and Developing Media for Instruction.* Co-Published by American Society for Training and Developemnt and Van Nostrand Reinhold, 1976.

Eastman Kodak Co., *Slides With a Purpose.* Rochester, NY Eastman Kodak Co., 1974.

Eastman Kodak Co., *Artwork Size Standards for Projected Visuals.* Rochester, NY, 1966.

Eastman Kodak Co., *Legibility-Artwork to Screen.* Rochester, NY, 1971.

Eastman Kodak Co., *Effective Lecture Slides.* Rochester, NY, 1966.

Department of the Army, *Interim Specifications for Training Extension Course (TEC) Materials.* Fort Eustis, VA: Army Training Extension Course Program.

Kemp, Jerrold E., *Planning and Producing Audiovisual Materials.* Third Edition. New York: Thomas Y. Crowell, 1975.

EVALUATING MEDIA

Two types of media evaluation are presented here. The *first* is the evaluation that takes place when a medium is in the process of development and is completed in "rough" form; the *second* is evaluation of finished products, either commercially available or those which are revised after an earlier evaluation.

Background and Assumptions

The aim of the field test (or validation) is to insure that materials will have a known probability of success, given a target audience of known characteristics. The conditions for the materials being tested requires that the target audience include personnel (present and future) who must achieve a particular objective. This class of individuals (population) could be very large, and for purposes of these guidelines will be considered infinitely large. The assumption is that this large population has stable characteristics and that individuals currently available are representative of that population. The goal of field testing is to certify the effectiveness of material in terms of the large population. The method of validation then involves the making of an inference about that population from a sample. The sample is formed by randomly selecting a group of currently available personnel. In order to infer that the materials are effective under their intended conditions of use, the exposure to the materials during the administration of the lesson should match the intended conditions for actual use of materials (see Figure 11).

Field Testing

The following procedures are suggested for the field testing of any medium. Individual and small group trials should be conducted by the contractor or EPA department in cooperation with the project manager. The location of field tests may be at any site where a suitable target audience population is available.

Expert Appraisal

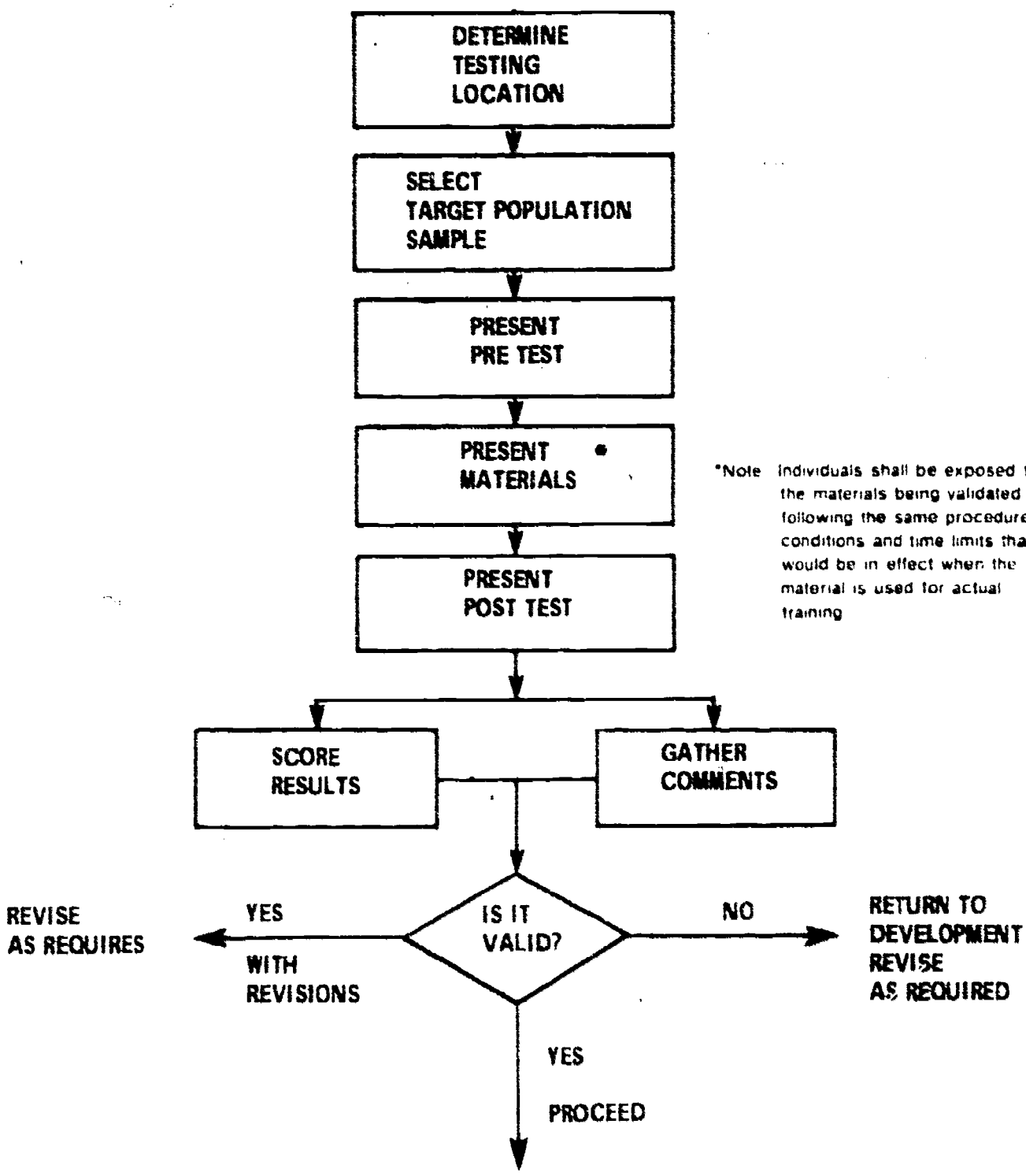
When an early version of the material is sufficiently complete to permit evaluation by a subject matter specialist, it should be given to such a person for the purpose of a technical content review. At this point, content accuracy is being determined. Any material must pass this review before further production is begun.

Individual Trials

Individual trials should be conducted with three to five individuals. Administration of materials with three to five persons, individually, who are representative of the target audience, will constitute *one* trial. These trials should be conducted for the purpose of identifying those areas within the materials which require revision to insure effective presentation. The writer or the producer of the medium should participate in the conduct of individual trials for that material.

Small Group Trial

This trial should be conducted by the contractor after making revisions recommended by the individual trials. Procedures are similar to the individual trial except that six to ten persons should participate and, where practical, view the materials simultaneously. The primary objective of the small group trial is to identify areas within the medium which require revision to insure effectiveness. The trial could be carried out as part of a pilot test for a course or under other appropriate conditions.



*Note Individuals shall be exposed to the materials being validated following the same procedures, conditions and time limits that would be in effect when the material is used for actual training

Figure 11. Procedure for Field Testing

Procedures

The evaluation procedures to be used during the field test will vary depending upon the content and approach. Special attention will be given to assessing the extent to which the objectives were reached. A second type of evaluation during the individual and small group trials concerns viewer attitudes and feelings toward the product. An example of such an evaluation form is shown in Figure 12.

Product Evaluation

One of the traditional approaches to evaluation of any medium is to have expert appraisals of a completed product. A host of evaluation forms are available from educational organizations. However, one allpurpose evaluation form has been developed which permits evaluation of any medium. (Figure 13)

Prior to using these forms it should be remembered that the *objective* of the presentation is clear or implicit and thatthe *designated audience* is defined as specifically as possible. Without these basics, an evaluation is merely a report of the feelings held by any individual previewer. Remember, a content specialist can evaluate the accuracy and adequacy of substantive information but if it is intended for an audience that is unfamiliar with the information being presented, the expert cannot adequately assess the potential users in order to be comprehensive in judging any medium.

During the evaluation process, it is recommended that a material be viewed after essential introductory information is given. For example, the purpose and intended audience may be indicated in accompanying literature. The material should be viewed, without interruption, and evaluation forms completed *before* discussion. It is important to record immediate reactions without intervening commentary which might influence interpretations. Further notes can be made after the discussion.

The evaluation forms which follow can be duplicated or they may be adapted to fit local needs.

References

Association for Educational Communications and Technology, *The Messege is You.* Washington, DC: AECT, 1971,

Anderson, Ronald H., *Selecting and Developing Media for Instruction.* Co-Published by American Society for Training and Developemnt and Van Nostrand Reinhold, 1976.

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Department of the Army, *Interim Specifications for Training Extension Course (TEC) Materials.* Fort Eustis, VA: Army Training Extension Course Program.

Kemp, Jerrold E., *Planning and Producing Audiovisual Materials.* Third Edition. New York: Thomas Y. Crowell, 1975.

Date_____ Material Title_____

Course Title _____ Instructor_____

Please circle the most appropriate alternative.

1. This sequence of material was:

   (1) extremely interesting
   (2) interesting
   (3) somewhat interesting
   (4) uninteresting
   (5) boring

2. The material was paced:

   (1) much too fast
   (2) a little too fast
   (3) just right
   (4) a little too slow
   (5) much too slow

3. I learned:

   (1) a great deal
   (2) some
   (3) not very much
   (4) nothing

4. This sequence was:

   (1) very clear
   (2) clear
   (3) slightly confusing
   (4) very confusing

5. What I learned was:

   (1) very important
   (2) important
   (3) generally unimportant
   (4) a waste

6. Generally, this sequence was:

   (1) excellent
   (2) good
   (3) fair
   (4) poor

7. Please write at least one specific comment here. Please indicate any questions raised by the sequence. Thank you.

Figure 12. An Example of a Brief Questionnaire

(Circle) Film, Filmstrip, Motion Picture, Recording, Slide/Tape, Sound Filmstrip, Videotape, Other_____

TITLE_____ Reviewed by_____ Date_____

Description: Color___ Black & White___ Time___ No. of frames___ Production Date_____

Purchase Price_____ Purchase Source_____

USE DATA: Recommended Audience_____

Objective(s)_____

Is the content valid, correct, and truthful? Yes____ No____

(Does this material provide additional desirable information which is above and beyond what you can now provide with materails currently used in this context?)

Yes____ No____ If "Yes", what?

EVALUATION

Objectives: Explicit and Stated____ Implicit(not stated)____ Not evident____

Content: Superficial____ Too Detailed____ Well Balanced____

Authenticity: Acceptable____ Not Acceptable____

Vocabulary: Excellent____ Good____ Poor____

Organization and Continuity: Excellent____ Good____ Poor____

Photography or format: Excellent____ Good____ Poor____

Sound: Excellent____ Good____ Poor____

User's Guide or Manual: Excellent____ Good____ Poor____ None available____

GENERAL RATING: Excellent____ Good____ Poor____

RECOMMENDED FOR FUTURE USE? Yes____ No____

CONTENT: (Brief description of the material):

Figure 13. All Purpose Evaluation Form

U.S. GOVERNMENT PRINTING OFFICE: 1982 -657-146/5624