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Edward Ambrose Francis

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Norman T. Bell

Major professor

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LEARNING FROM SUPPLEMENT MATERIALS: THE EFFECTS OF OVERVIEW, INSTRUCTIONAL OBJECTIVES AND STRUCTURED NOTES

By

Edward Ambrose Francis

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ABSTRACT

LEARNING FROM SUPPLEMENT MATERIALS: THE EFFECT OF OVERVIEW, INSTRUCTIONAL OBJECTIVES AND STRUCTURED NOTES

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The research question that provided the focus of this study was: Will using supplementary materials with an instructional film result in improvement in student learning and attitude. The separate effects of adding Overview, Instructional Objectives and Structured Notes (review) were investigated. Both cognitive and attitudinal measures were used.

There were three distinct components of the experience: The viewing of the audio-visual production, the exposure to supplementary materials, and completion of the evaluative measures.

In order to investigate the research question, three hypotheses were developed: Hypothesis one (1): There will be a treatment effect on the immediate posttest. Hypothesis two (2): There will be a treatment effect on the delayed posttest. Hypothesis three (3): There will be a treatment effect on a student attitude scale.

The dependent variables of the study were (1) learning, the amount of cognitive information recall indicated on the posttest, both immediate and delayed, and (2) attitude, the learner's attitude toward the supplementary materials measured by an attitudinal survey. All three dependent variables were analyzed using one-way ANOVA's at the alpha equals .10 level.

The main conclusions of the study were: (1) The treatments had an effect on learning as tested using an ANOVA one-way analysis of variance of learning. Students who were provided supplementary materials learned more than those students who were not provided supplementary materials. (2) The treatments did not have an effect on student attitude as tested using an ANOVA one-way analysis of variance.

Tukey Post-Hoc tests revealed that all treatment groups did better on the immediate posttest than the control group. The same test revealed that the Two-Aid treatment, i.e., Instructional Objectives plus Structured Notes, did better than the control group on the delayed posttest.

The main recommendations are: (1) When using audio-visual productions in the classroom, supplementary materials should be provided so as to enhance learning. (2) If both short and longitudinal cognitive recall is important, using Instructional Objectives plus Structured Notes should be emphasized. (3) The producers of educational audio-visual productions should produce supplementary materials, i. e., Overview, Instructional Objectives, and Structured Notes which could enhance the educative value of the production.

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There is only one name under heaven by which all men must be saved: the name of Jesus. And there is only one name on a dissertation: the name of the researcher. It is only through God and the woman that the WORD (Jesus) became flesh and gives new birth to men. And, it is only through the combined input of many individuals that a dissertation is profitable for knowledge and understanding.

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I STATEMENT OF PROBLEM

OVERVIEW

The first topic to be presented in Chapter I is a general BACKGROUND OF THE PROBLEM which stated simply is to explore the effects of using supplementary learning materials with an audio-visual instructional presentation. Next is the PROPOSED SOLUTION to the problem, that of using supplementary materials to enhance the learning through use of the audio-visual instructional presentation.

The third topic of Chapter I is the PURPOSE OF THIS RESEARCH, which is to determine the impact of supplementary materials on learning. This is followed by the RESEARCH QUESTION and HYPOTHESES and DEFINITIONS OF IMPORTANT TERMS sections. Chapter I concludes with a SUMMARY and an OVERVIEW OF OTHER CHAPTERS IN STUDY.

BACKGROUND OF PROBLEM

Wittich (1964) conducted a study involving some 264 grade school pupils. He attempted to find which of three classroom methods in using

films was most effective in teaching factual information and social understanding. The following three methods of utilization were employed: One method was to show the film without much preparation or anticipation, and immediately after the showing administer a fifty item test. By means of a second technique pupils were informed about the general content of the film, studied words and phrases necessary to an understanding of the commentary, read questions which anticipated the major fields of information, saw the film, and finally took the test. With the third method, the class was conducted in the same manner as method two but in addition the pupils discussed a set of questions based on the film, saw the film a second time and immediately took the same test again.

It was found that the pupils who were instructed by means of method two learned 50 percent more than those instructed by method one and that classes using method three were 100 percent superior to classes using method one. Not only did pupils acquire more factual knowledge but they were substantially more capable of making social judgements. It was noted also that the more difficult the film, the greater the gains of method two and three. Wittich showed that by anticipating the film content, by building a readiness for the film, by directing observation, and by intensive utilization, it was actually possible to increase the learning gains from a film by as much as 100 percent.

Wittich indicates that the proper use of film in the classroom has been an issue since the 1940's. Yet, while there has been rapid increase in the use of educational films since the 1940's, little emphasis has been placed upon the use of supplementary materials related to film use. It appears that the questions of how people learn from meaningful supplementary materials and of how such learning can be enhanced have, for the most part, been ignored. Carroll (1968) observed that

learning theorists expect to find explanations regarding acquisition of information from supplementary materials. His research concluded that improved cognitive and attitudinal results will be enhanced by adding mathemagenic exercises, i.e., activities which require the student's physical as well as mental involvement, to the showing of films in the classroom.

PROPOSED SOLUTION

Thus there appears to be a need for learners to have access to supplementary materials in conjunction with extant materials. The general goal of this research was to determine the effects of using supplementary materials in addition to audio-visual productions. It was hypothesized that the use of supplementary materials for the enhancement of cognitive recall can be accomplished by using supplementary materials in conjunction with audio-visual productions.

The cues supplied to the learner using supplementary materials may be of any degree of complexity, and may be altered for subsequent use with audio-visual productions. It is further hypothesized that by supplying supplementary materials which involve mathemagenic participation by students, both the cognitive recall and the attitude of the students will improve.

PURPOSE OF THIS RESEARCH

The research investigated the cognitive and attitudinal effects of adding Overview, Instructional Objectives and Structured Notes (review) to an audio-visual production. The two dependant variables of concern were

(a) cognitive recall and (b) attitude. The following research question and hypotheses were used to provide an operational statement of this purpose. Thus, the primary purpose of the study is to introduce and test the impact of supplementary materials in conjunction with viewing an educational film.

RESEARCH QUESTION AND HYPOTHESES

RESEARCH QUESTION

The primary question of interest is: Will using supplementary learning materials with movies result in improvement in student learning and in improvement in student attitude toward the educative experience. The research question suggests, among many possible hypotheses, hypotheses concerning both student cognitive performance and student attitude toward the learning experience.

RESEARCH HYPOTHESES

In order to investigate the research question of this study, the following three hypotheses have been developed:

I. Student Learning Hypotheses

Dependent Variable: Learning

H_1: There will be a treatment effect on the immediate posttest, i.e., the adding of supplementary materials will cause some treatment groups to retain more cognitive information than other treatment groups.

H_2: There will be a treatment effect on the delayed posttest (approximately four weeks after the first test); i.e., some treatment groups will retain more cognitive information than other treatment groups after a time period of 30 days.

II. Student Attitude Hypothesis

Dependent Variable: Attitude

H_3: There will be a treatment effect in student attitude for various levels of supplementary materials, i.e., students receiving more supplementary materials will indicate more appreciation than those students receiving less supplementary materials.

DEFINITION OF IMPORTANT TERMS

To heighten and delimit the study and to give added impetus to the research question and hypotheses, the following terms were defined.

1. Learning - Cognitive information retained between the treatments and cognitive posttests.
2. Learners - Subjects in the study. The learners were ninth grade high school students.
3. Supplementary Materials - Printed and visual aids made available to students in the experiment:
    a) Overview- To answer the question: "What's this film all about?"

b) Instructional Objectives - To answer the question: "What am I to learn from this film?"

c) Structured Notes (guided review) - To answer the question: "What should I focus on as I review the film?"

Note: The supplementary materials follow a question-statement format. The materials were typed and then processed for overhead projector use.

4. Aid - An instructional message, either questions or statements, calling for a particular response, i.e., Overview, Instructional Objectives, and Structured Notes.

5. Treatment - The experimental variable. There are three treatment groups and one control group: The three treatment groups are as follows:

   a) Three Aids - Receives three aids: Overview, Instructional Objectives, and Structured Notes as well as cognitive test and attitude scale.

   b) Two Aids - Receives two aids: Overview and Instructional Objectives as well as cognitive test and attitude scale.

   c) One Aid - Receives one aid: Structured Notes as well as cognitive test and attitude scale.

6. Testing Occurrence - Two occasions when learners in the study complete the cognitive tests.

7. Cognitive Test - An instrument to evaluate information recall.

8. Effects - The cognitive and affective results of systematically inducing the aids: Overview, Instructional Objectives, and Structured Notes into the experiment.

9. Common Practice - Refers to teaching practices usually used when a film is shown in the classroom, i.e., teacher threads the projector, verbally introduces the film, turns the projector on, turns the projector off, and rewinds the film. Learners are often asked to write notes on the film while the film is in progress.
10. Attitude - The degree to which the student favors or disfavors the supplementary materials used in the three experimental groups.
11. Attitude Survey - An instrument to measure like and dislike of supplementary materials (An adaptation of an attitude survey used by Sargent; Sargent, unpublished dissertation, MSU, 1975).
12. Extant Materials - Available audio-visual productions intended for classroom use, i. e., an educational film.

SUMMARY

The focus of Chapter I was on the use of supplementary materials, i.e., Overview, Instructional Objectives, (guided review) to enhance cognitive recall of audio-visual productions. Three hypotheses were presented relating to the cognitive and attitudinal effects of supplementary materials. Further, hypothesis three submits that student attitude toward the educative experience will improve as more supplemantary

materials are used with an audio-visual production. The definition of terms is very important because the use of the terms "supplementary" and "aid" vary somewhat from ordinary usage.

OVERVIEW OF OTHER CHAPTERS IN STUDY

Chapter II, Review of Pertinent Literature, focuses on the evaluative comparisons of instruction, Instructional Objectives, Advance Organizers, and Structured Notes (guided review). Chapter II presents a series of studies which emphasize the role of supplementary materials as related to audio-visual productions, cognitive recall, and student attitude toward supplementary materials.

II REVIEW OF PERTINENT LITERATURE

OVERVIEW

The literature related to the thrust of this study was reviewed from these perspectives: (1) Evaluative Comparisons of Instruction, (2) Instructional Objectives, (3) Advance Organizers, and (4) Structured Notes.

EVALUATIVE COMPARISONS OF INSTRUCTION

From the early 1920's to 1950's, research in instructional media was almost exclusively directed to evaluate comparisons of instructional film with conventional methods of teaching. The collective findings of similar types of investigations show trends which serve as valuable guidelines for further inquiry.

The most comprehensive review of early research in this area is the work of Hoban and Van Ormer (1950) which examined nearly two hundred experimental and survey studies conducted between 1918 and 1950. The comparative aspects of these studies furnished the basis upon which the entire audio-visual movement was justified. A review of findings confirmed the overall effectiveness of film and other forms of mediated instruction (Moldstad, 1974). With the challenge that "conventional

methods" of teaching with highly trained instructors were no more and often less efficient than information transmission dependent upon audio-visual presentations, the military services took the lead in instructional media research during and for several years after World War II.

The series of studies by Hoveland, Lumsdaine and Sheffield (1949), the reports of the Army Air Force Aviation Psychology Program by J. J. Gibson (1947), the Instructional Film Research Program conducted by C. R. Carpenter from 1947-1955 under the direction of the Navy's Special Devices Center (Carpenter, 1953; Carpenter and Greenhill, 1956) and A. A. Lumsdaine's research program for the Air Force Research and Development Command from 1950 through 1957 (Lumsdaine, 1961) reflect a systematic, programmatic effort to deal with psychological, production and utilization variables at a new level of precision.

The most recent evaluative research cycle began in the early 1960's as interest in programmed instruction gained impetus. Although most of the effectiveness studies compared the programmed materials with face-to-face instruction by a teacher, gradually the interactive effects of learner, task, and program variables affecting student achievement were also explored.

In an extensive review of the literature published between 1966 and 1971, and in citing other significant reviews, Campeau (1974) found that studies comparing programmed with conventional instruction have yielded mixed results with few significant differences reported across a wide range of subject matter and age groups. (Schramm, 1964; Campeau, 1967; Briggs, 1968, 1970)

In general, comparative evaluations of programmed instruction and conventional instruction confirm previous findings of no significant difference in effectiveness of presentation modes when each is treated as a whole. Although these results are regarded as negative by some educators, there is a partial value in knowing that alternative methods of presentation are available for use with little or no apparent gross differences in learning achievement.

As a further refinement in research comparing visual materials for instruction, Dwyer (1973) designed a study to determine the degree of effectiveness by which illustrative material presented by different channels facilitated student achievement on all five criterial measures.

A related effectiveness study by Leroy Ortigiesen (1954) compared filmstrips, sound films and printed materials in: (1) teaching information about and (2) changing attitudes towards soil conservation. It was found that filmstrips were significantly more effective in achieving cognitive objectives than sound motion pictures, and both were more than printed materials. Film strips and sound films were as effective in changing attitudes as were printed materials.

In general, data on students' attitudes toward mode of instruction are inconsistent and show little or no relationship between attitude and measured learning. Preference of specified modes of instruction appears to vary not only with individuals but also with respect to content, instructors involved, and physical environments available. Ortigiesen (1954).

In an extensive review of theory, research and practice in instructional media, Saettler (1968) concludes that there is a basic need for a scientific approach in delineating principles from which a framework of

instructional technology theory can be synthesized. A historical distinction is drawn between the audio-visual movement whose primary concern was use of specific media and "... impirical data based on the total teaching-learning process (p. 193)." Although Saettler clearly makes the point, educational literature in general does not.

Within the context of theory construction, Snellecker (1974) discusses four general developmental stages in current research interests which contribute to the integration required:

1. Delineation of educational objectives in measureable terms, specifications of methods and self-corrective evaluations of instructional experiences as encouraged by the operant theory and techniques of programmed instruction
2. Development of interaction analysis systems for classification and objective reporting of teacher-student behaviors
3. Broadening instructional principles from a "hardware" technology orientation to a systematic evaluation of combined human and non-human resources in effective instruction
4. Scientific means for testing principles of curriculum construction and instructional design

Both theorists and researchers currently emphasize the need to examine all variables in the instructional system if a fund of scientific information is to be developed.

A study of this complex interaction of stimulus, task, learner and situation variables has been attempted in a number of investigations during the past few years. Campeau (1974) cites several multivariate

designs such as the work of Siegel and Siegel (1966) with television university instruction; Snow and Solomon (1968), Cromback and Snow (1969), Tollmadge and Shearer (1969), and Snow (1970) with methods for detecting individual differences to assign learners to treatment conditions; Briggs, et. al. (1966), Gagne (1968), and Briggs (1970) with procedures for analyzing components of the experimental task; and Solomon and Snow (1968) and Briggs (1970) with methods of specifying media variables.

In discussing efforts such as the above, Allen (1971) states that "...the significance of the present research is that careful investigation (sic) of the design element in mediated instruction are being made and that these searches are being conducted within a theoretical framework, thus laying a foundation for a theory of instructional media" (p. 12).

One of the most interesting studies done by Rothkopf concerned the value of note taking during film viewing (Ash and Carlton, 1953). Four groups were given the following treatments: Group A saw the film and took a posttest. Group B saw the film, took notes while viewing the film, then took the posttest. Group C saw the film, took notes while viewing, reviewed their notes for ten minutes, then took the posttest. Group D was a control group which saw the film and took the posttest only. Test data for the sample of 216 subjects indicated that: "The highest test scores were made by the group that watched the films without taking notes" (p. 124).

SUMMARY

Early instructional media research was typified by evaluative comparisons in an attempt to prove their effectiveness in the teaching-learning process. Although results of studies dealing with information transmission through specified media as compared with the current teaching practice did verify that knowledge had been gained by the learner, Schramm (1973) concludes: There is almost a complete lack of studies intended to ascertain under what conditions and for what purposes one medium may be superior to another. And a high proportion of all the experiments that do address themselves to the problem are deficient in some way, either in design or in realism. We can, therefore, look only for a trend, rather than a conclusion, in the existing literature.(p. 62)

These considerations lead to media research which turned from comparions of alternative methods of achieving objectives to a study of the characteristics within each method of instruction. An extensive effort was made to establish principles for selecting and utilizing specific modes for achievement of specific educational objectives.

Most experimental designs in the early evaluative comparison studies had not separated for analysis the factors which contribute to the improvement of learning. With the refinement of multi-variate analysis in research methodology, a more accurate interpretation of findings regarding the unique attributes of instructional media were studied under controlled experimental conditions.

Other theories suggest that addition of cues to approach realism may be unnecessary (Instructional Film Research Program, 1954) or distracting (Miller, 1957) by eliciting competitive responses opposed to the

task, i.e., if the task is to recall the color of several differently coated dogs, the inclusion of the sounds the dogs make when barking, growling, etc., may be a deterrent rather than a help in recalling the color of the various dogs. Bruner, Goodnow and Austin (1956) proposed that attributes of an object or situation need not be in realistic detail for the learner to categorize appropriately. Travers (1964) points out that inputs of information are coded and much information available to the senses never enters the perceptual system.

INSTRUCTIONAL OBJECTIVES

In a recent attempt to compare student attainment of instructional objectives using visuals of varying degrees of reality, Francis Dwyer (1973) presented equivalent content to learners in the formats of television, slides and illustrated programmed instruction to complement equivalent oral or verbal instruction. The degree of effectiveness of five visual sequences of varying reality (from line drawings to photographs of a real object) was studied within each of the three modes of presentation. Results showed no significant difference in effectiveness of the three methods of presenting the content as measured by general student achievement. Analysis of separate critical tests showed that the degree of reality in the illustrations in the three methods positively affected student achievement in drawing, identification, terminology and comprehension. The number of relevant and irrelevant cues and the pacing of the instructional program were suggested as factors contributing to the varied

results. It appears that the mode of presentation, together with the degree of reality in visuals, interacts and influences achievement of specific instructional objectives. These results confirm and extend earlier studies in which selected production variables were controlled to approach reality more closely as compared with alternate production techniques.

In 1951, Neu investigated cues as attention-gaining rather than attention-directing devices. A different combination of relevant and irrelevant, visual and sound cues were used in each of four modified measuring instruments. Tests showed that the control version without special devices was significantly superior as an instrument for learning. The version with irrelevant sound effects was most distracting and least effective, although subjects tended to remember irrelevant cues most clearly.

The advocates of mediated instruction take the position that the use of audio-visual materials brings the learner into close contact with reality by presenting stimulus patterns in much the same way as they are presented by the environment. It would seem, however, that the concept of bringing the student into close touch with reality is an assurance that he will be more proficient in dealing with reality as a result of having had this prior experience. The emphasis of the current study was to show that the effectiveness of mediated instruction per se can be enhanced by using instructional objectives in conjunction with the mediated instruction.

Gestalt psychologists accept practice and repetition for establishing desires responses but do not consider them necessary conditions of learning. Practice can help the learner to maturate the structure of the procedure or concept being taught and also to individuate its functional

parts so that they are seen in their proper role in the structure. In these cases, the amount of practice is less important than the kind of practice. (Luchins, 1961) Methods of providing practice such as the insertion of questions in written instructional material appear to increase the amount of learning from the test. (Frase, 1970; Rothkopf and Bibicos, 1967)

Dyer and Kulhany (1974), in an experiment with undergraduate students using a programmed text, manipulated both sequence and distributed practice effects by varying the location and order of the experimental frames throughout a body of nonrelated placebo text. The results across the four treatment groups showed little effect on amount of recall whether practice was massed or distributed, but cognitive performance was significantly suppressed by the disordering procedure. The investigators reasoned that attending behavior is a pivotal factor. Subjects did not maintain high levels of attention when both disorder and distribution were manipulated. As Tobias (1972) points out, sequence effects are most powerful when subjects have little preknowledge and find the content difficult. The conclusion to the study suggested that sequence should be an important consideration in instructional design if presentation familiarity is low and the material is non-redundant. While sequencing of supplementary materials was not a major concern of the current study, the study does investigate the vital role supplementary materials have in cognitive achievement when used with an audio-visual production.

ADVANCE ORGANIZERS

Studies by Hoveland, Lumsdaine, and Sheffield (1949) support the theory that relevant introductory procedures have motivational as well as the practice effects of repeating material in a different symbolic form. In one study, military trainees learning map reading with filmed instruction were randomly divided into two treatments: (1) discussion of the film content prior to film showing and (2) review of content after film showing through testing followed by discussion of correct answers. Both treatments resulted in small but reliable increases in informational learning with both high and low intelligence groups. Stein (1953) found that a pretest on the instructional content of the film increased learning even without knowledge of test results. The viewers were in effect told what they were to learn, thus providing an organizational framework for subsequent learning.

Ausubel (1963) proposed the theory that to the degree that an individual's knowledge in a particular field is organized, stable and clear, new material will be more easily learned and retained. Use of advance organizers for developing adequate cognitive structures for specific learning tasks has been shown to result in: (1) improved concept acquisition (Ausubel and Firzgerald, 1962), (2) fewer errors during learning and testing (Merrill and Stolurow, 1966), and (3) greater transferability of concepts (Groteleuschen and Sjogren, 1968).

The critics of cognitive structure theory, however, point out that many studies which show increased learning using introductory procedures,

also provide increased time for learning without accounting for the use of that variable. In addition, Gagne (1965) and his followers hold that overview should not be generally recommended since conditions of learning require lower levels of knowledge before the learner can move upward to the more complex. In an extensive review of the literature, Barnes (1972) concludes that the controversy between educative methods (i.e., use of advance organizers) and inductive methods (i.e., discovery approach) remains unresolved, especially regarding the important issue of transfer. Conflicting theories based on experimental evidence demonstrate the difficulty in identifying and controlling for the influence of many complex variables in an instructional program.

The majority of studies which compare learning effect of variables within a stimulus medium have shown wider variations in amount of learning measured than have comparisons between modes of instruction. In either case, recognition of specific learning effects is dependent upon the identification and control of all variables in such a way that the measured performance is not an average efficiency over many unknown functions. Since this study examines the variables within a mode of instruction, it is logical to expect results which discriminate between similar varibles.

The complexity of interactive elements in instructional systems has made accurate assessment of learning an overwhelming task both in the teaching situation and in attempts to measure transfer of information. A further complication has been the tendency of researchers to design more efficient controls by using laboratory settings for collection of data. Results of investigations carried on in an artificial situation have often

been in conflict with similar work in natural settings. This discrepancy raises the question of the value of data from experimental variations controlled to the degree usually associated with laboratory studies, since these usually cannot be generalized to the natural learning environment.

Ellison (1973) points out that assessment of instructional objectives for maximum validity must be made through the use of tests designed to fit the method of teaching and performance expectation as well as content. In courses in which visual skills are important objectives, media presentations might be expected to be a superior form of instruction, yet research shows few examples of visual evaluation techniques used to determine effectiveness. Postman and Schwartz (1964) found that method of practice influenced learning to learn. The data for the effectiveness of supplementary materials was collected in a natural student setting. Thus, all other variables being controlled and accounted for, the results should be readily applicable to the classroom environment.

Theories regarding the transfer of learning are based on reliable evidence that transfer does occur. Concepts and principles show higher positive transfer than factual information and facilitate attainment of successive concepts of the same class (Wittrock, 1963; Klausmeir, Harris and Wiersma, 1964). General learning transfers more readily to new situations than specific information but the individual must perceive the new situation as being similar to that in which the initial learning occurred. It appears that the more similar the instructional situation is to the conditions of later application, the higher the probabiltiy of transfer (Cruckshank, 1974).

SUMMARY

The "pay off" from the above reviewed research findings lies in the promise of an alternative to more expensive and time consuming instructional design. Rothkopf (1970) states: "The concept of mathemagenic activities tends to shift emphasis from investment of resources in development of instructional materials, to the investment in the instructional environment. Instructional materials are accepted within limits as given. Emphasis in instruction is on promoting those activities in the student that will allow him to achieve instructional goals with available materials" (p. 334). This statement is precisely the rationale behind the present study... the identification and examination of practical strategies to improve cognitive recall and appreciation by engaging the learners in activities which leads to fulfilling instructional goals.

STRUCTURED NOTES

There are several rationales for expressing objectives in education. Duchostel and Merrill (1973) suggest that objectives serve three major functions: First, objectives provide direction for teaching and curriculum development. Second, they provide guidance in evaluation. And third, they facilitate learning. The present review is concerned with the third of these catagories, that is, objectives used for the express purpose of assisting the learner, i.e., through the use of Structured Notes (guided review).

In a study by Koplan and Rothkopf (1972), a complex 3X2X3X2 factorial design to examine three prose passages, two levels of objectives (general and specific), three levels of density (20%, 40%, 60%), and two kinds of learning (intentional and incidental). Intentional learning was defined in terms of questions relevant to objectives, while incidental learning was defined in terms of learning not specified by objectives. Density was defined as the ratio of relevant sentences to the total number of sentences, where a relevant sentence was a sentence directly relevant to an objective. Results showed that: (1) Intentional learning was greater than incidental. (2) Specific objectives resulted in higher performance than general objectives for intentional items. Specificity of direction had little or no effect on incidental learning. (3) Increases in density were accompanied by decreases in the proportion of intentional items that were correctly recalled. There were no measurable effects of density on incidental learning (p. 2). Most interesting to Kaplan and Rothkopf was the implication that: "Carefully specified instructional objectives will not interfere with the serendipitous discovery of information not directly relevant to instruction." This finding is reassuring because serendipity in education should be a concern among educational technologists.

When considering the hypothesis that students would show a more positive attitude towards instructional objectives stated as behavioral objectives, Walbesser and Eisenberg found two studies supporting the hypothesis.

SUMMARY

This chapter has summarized research and literature related to the present study.

Techniques of film use were examined and much variation was found in the use of film for educative purposes. In particular four specific areas were examined. These were (1) Evaluative Comparisons of Instruction, (2) Instructional Objectives, (3) Advance Organizers, and (3) Structured Notes (guided review).

The research of the early 1950's on evaluative comparisons of instruction confirmed the overall effectiveness of film and other forms of mediated instruction. However, Campeau (1974) found that studies comparing programmed with conventional instruction have yielded mixed results with few significant differences reported across a wide range of subject matter and age groups.

The research on instructional objectives seems to emphasize two points: (1) The effectiveness of materials to simulate and suggest the thinking process which should or could occur within the student's mind, and (2) the use of audio-visual materials brings the learner into close contact with reality by presenting stimulus patterns in much the same way as they are presented by the environment.

The research on advance organizers indicates that to the degree that an individual's knowledge in a particular field is organized, stable and clear, new material will be more easily learned and retained. The research also indicated that note taking by the students while viewing an audio-visual production is cognitively counter-productive. The structured notes (guided review) of the current study were presented after the viewing of the audio-visual production.

Finally, research on structured notes (guided review) was reviewed. This research revealed that density and specificity of direction

of patterns of instruction had little effect on serendipitous discovery. And, two studies supported the hypothesis that students would show a more positive attitude toward instructional objectives stated as behavioral objectives.

All the above areas of emphasis consistently revealed the need for research in the area of supplementary material use as related to audio-visual productions.

The review of literature related to the intent of this study has consistently shown that the learning process is far more complicated than the research designs that have attempted to examine it. Until the recent refinement of statistical tools, it was impossible to deal with the amount of data generated by separation of factors which were contributing to the measured effects. Further, as these factors interact, the total impact is greater than typical investigations have been able to interpret.

To approach the complexity of any facet of instructional research requires an awareness of past contributions to the field and of trends in current investigations. Only though interlocking experiments of manageable scope can sound principles be formulated to provide a basis for instructional practice.

The present study extends some of the concerns brought out in the literature review. Specifically, what is the effect of providing various amounts of supplementary materials on learning from film used in the class room? And, will providing various amounts of supplementary materials in conjunction with learning from an audio-visual production, in this case a film, affect the attitude of the students?

III RESEARCH DESIGN AND PROCEDURES

Chapter III presents a detailed description of the various phases of the design and research procedures used in this study. This section presents the experimental design, describing the development of both the treatment materials and the evaluative instruments. The second section describes the procedures that were followed to implement the design.

DESIGN

There are two design-related topics to be discussed. First, the Design Over Time section illustrates the overview of the procedures, and builds the foundation for the discussion on the validity of the research, i.e., Validity Concerns. Second, the Design Over Variables section details the interrelation of the variables used in the study and their analysis. And this provides the foundation for the Research Hypotheses section.

DESIGN OVER TIME

This study takes the form of a posttest and delayed posttest, Control design, similar to Campbell and Stanley's (1963, p. 8) design number 6, with the addition of the materials dimension. Figure 3.1 shows the relationship between the three treatments (X_{1-3}), Control group (X_4), occasions of testing (O), and materials (M).

3 Aids	M_1	X_1	O_1	O_2	O_3
2 Aids	M_2	X_2	O_1	O_2	O_3
1 Aids	M_3	X_3	O_1	O_2	O_3
Control	M_4	X_4	O_1	O_2	O_3

------Time------

Figure 3.1----Design Over Time

Legend:

M: Supplementary materials used by the treatment groups

M_1 - Three supplementary materials used

M_2 - Two supplementary materials used

M_3 - One supplementary material used

M_4 - No supplementary materials used

O: Occasions of testing

O_1 - First occasion of administering cognitive test

O_2 - Second occasion of administering the cognitive test occurred thirty days after the first test

O_3 - The administering of the attitude survey immediately after the second occasion of the cognitive test

A posttest only design was chosen over a pretest-posttest design for two reasons. First, Campbell and Stanley indicate that a posttest only design generally has higher external validity than a similar pretest-posttest design because the pretest can be reactive and sensitize the subjects. Second, the computation of gains, made possible by the inclusion of pretest, were not relevant to test the hypotheses of interest in this study.

In considering the DESIGN OVER TIME, the following components of Figure 3.1 will be explained: EXPERIMENTAL TREATMENTS (the X's), LEARNERS within the treatments, and MEASURES (the O's).

EXPERIMENTAL TREATMENTS

There were two distinct components to the experience: the viewing of an educational film, and the exposure to supplementary materials.

The treatments varied according to the supplementary materials supplied. The treatment containing three supplementary materials, i.e., Overview, Instructional Objectives, and Structured Notes (guided review) was sequenced so that Overview and Instructional Objectives were first

exposed to the subjects, then the film presented, and finally the Structured Notes provided. The treatment containing two supplementary materials, i.e., Instructional Objectives and Structured Notes, was sequenced the same except for the omission of the Overview. The treatment containing one supplementary material, i.e., Structrued Notes, was sequenced so that the film was presented, and then the Structured Notes provided. The Control group were presented with the film only. Figure 3.2 below illustrates the sequencing of supplementary materials.

TREATMENTS	SUPPLEMENTARY MATERIALS		
AIDS	OVERVIEW	INSTRUCTIONAL OBJECTIVES	STRUCTURED NOTES
3 Aids	X	X	X
2 Aids	X	X	
1 Aid			X

Figure 3.2

Sequenced Supplementary Materials

LEARNERS

The learners in the study were drawn from a ninth grade population of 495 students at a high school in the mid-west. The age range of the learners is thirteen to fifteen years of age. The average I.Q. and standard deviation are near the expected values.

At the beginning of the semester, the school system randomly assigned students into groups of classes. The study used these intact

groups which were formed by assigning alternate numbers (odd-even) to each student and then placing odd-numbered students in one group and even-numbered students in another group. This process continued until all students were assigned groups. Since the school uses no system of tracking, the actual section a student was placed into was random within the constraints of his schedule. Thus, it is believed that the various groups were relatively equivalent for purposes of this study.

MEASURES.

The two methods used to measure the learner's cognitive recall and attitude were a twenty question cognitive test and a seven statement attitude survey. The cognitive test was composed of twenty multiple-choice questions. The learner, using a latent image marker format, was given the test and asked to indicate which answers were correct. The learners had four choices for each question with only one choice being correct. The learners were not permitted to ask questions pertaining to the definition of vocabulary during testing; however, directions for completing the test were repeated when necessary. The cognitive test is contained in Appendix A.

The attitude survey was a measure of the learner's perceptions of the adequacy and desirability of the supplementary materials provided. It contained items such as:

1. The materials were not useful.....1 2 3 4 5
2. I should have had more materials...1 2 3 4 5

The complete scale is contained in Appendix B. The attitude survey variable was the sum of all seven items, after the negatively stated items had been reversed. A Hoyt's reliability coefficient value of 0.67 was computed for this survey using the MSU version of the JENNRICH ANOVA program.

VALIDITY CONCERNS

This section discusses possible concerns for first, the internal validity of the experiment, and second, the external validity. Internal validity ask the question: Was the experimental treatment the real cause for the observed change? (Campbell and Stanley, 1963) When internal validity is violated, the values of the measurements (O's) for the various groups, i.e., treatments, are unexpectedly in error. External validity asks the question: To what populations, settings, treatment variables, and measurement variables can this effect be generalized? Violations of external validity, therefore, reduce the generalizability of the findings.

INTERNAL VALIDITY

The design over time is a form of the posttest-only control group design. This is a design which Campbell and Stanley show to have excellent internal validity. It, as used in this experiment, sufficiently controlled for the concerns of history, maturation, statistical

regression, selection, experimental mortality and their interactions. No unusual circumstances arose to warrant further discussion of the above concerns. Because there were two occurrences of the cognitive test, it might be suspected that the immediate posttest would effect the second posttest. Since the learners were aware of a second (first test repeated) posttest, the first test may have influenced the scores on the second test, but this was not a problem because this study does not compare the two tests. Further, the learners had equal opportunity to alter their performance on the second posttest. Therefore, this concern was greatly reduced. The method for measuring learning is stable over time since it is an objective measure.

The cognitive measure was subjected to an item analysis. The test was a twenty (20) question multiple-choice test. The item analysis indicated the cognitive measure had a mean item difficulty of twenty six (26) and an item discrimination of forty two (42) with a standard error of measurement of 1.742. The cognitive test was also subjected to the Kuder Richardson #20 reliability estimate. This estimate yeilded a reliability of .756. When the brevity and ease of difficulty of the test are considered, the analysis reveals the test to be an excellent one. It should be noted that the absolute scores on these cognitive and attitude measures are not important.

EXTERNAL VALIDITY

The threats to the external validity, or generalizability are controlled for in this study as explained by Campbell and Stanley.

The one concern which could threaten external validity is the reactive setting of the experiment. Circumstances allowed this experiment to be done so that the subjects were unaware that they were participating in a study. Even though the subjects were tested in a setting comprised of a number of students, the students completed the cognitive test and attitude survey independently of other students. The assumption of individual independence was supported due to the nature of the cognitive test and attitude survey as well as the belief that the students did not interact outside of the experiment. Consequently, the subjects were not cued to any unusual procedures, nor were they informed that they were being unusually measured. It seems most likely that all subjects believed they were just undergoing ordinary classroom procedures. Therefore, there is no reason to expect the Hawthorne effect to help one experimental group do better than the other groups.

In conclusion, the design of this study has been shown to be adequate with respect to violations of internal validity, thus, the data may be considered free from serious contamination.

DESIGN OVER VARIABLES

Whereas the design over time gave the overall picture of the procedures of the design, design over variables gives the inter-relationships of the variables used in the study and leads to the research hypotheses and together they lead to Chapter IV, the Analysis of Results.

VARIABLE MATRICES

The dependent variables fall into two groups, cognitive measures and attitude measures as shown below in figure 3.3 and figure 3.4.

TREATMENT			
3 Aids	2 Aids	1 Aid	Control
N = 44	N = 46	N = 44	N = 44

DEPENDENT VARIABLES

H_1 O_1 Immediate Posttest

H_2 O_2 Delayed Posttest

Figure 3.3

Variable Matrix For Learning

TREATMENT		
3 Aids	2 Aids	1 Aid
N = 44	N = 46	N = 44

DEPENDENT VARIABLE

H_3 O_3 Attitude Measure

Figure 3.4

Variable Matrix For Attitude

Because there is no theoretical or empirical basis to expect an interaction between the independent variables treatment and occurrence of testing, the design chosen for the cognitive dependent variable was two separate one-way ANOVA's rather than a single one-way ANOVA with repeated measures. The variable matrix used for Learning is a single dimensional

one having four (4) cells, one for each treatment, as illustrated in figure 3.3. The varible matrix used for attitude is a single dimensional one having three cells, one for each treatment receiving supplementary materials.

The attitudinal dependent variable is the total score from the attitude survey. The same subjects were used in the attitude variable matrix as were used in the cognitive variable matrices with the exception of the control group which was not included in the variable matrix for attitude.

STATISTICAL MODEL OF ANALYSIS

All hypotheses were tested using Analysis of Variance (i.e., ANOVA) at the α =.10 level as recommended by Borg and Gall (1971) for exploratory studies.

The usual ANOVA assumptions of (1) independence between groups, (2) equality of variance between cells, and (3) normal distribution of scores, were well met. Although the students were taken through the experiment on a group basis, the classroom environment and method of presenting the study support the concept that students reacted to the supplementary materials, the audio-visual production and evaluative measures in a relatively independent manner. That is, nothing unusual occurred which would corrupt what would be considered normal behavior on the part of the teachers and students, i.e., fire drills, someone shouting out an answer, or external classroom interruptions. It is also important to note that the one-way ANOVA for analysis of variance is robust to violations of normality.

RESEARCH HYPOTHESES

The testable hypotheses are given below. They are divided into Learner Recall and Student Attitude hypotheses to be analyzed by the variable matrices given in the Design Over Variable section.

1. Student Learning Hypotheses

   Dependent Variable: Learning

   H_1: There will be a treatment effect on the immediate posttest.

   H_2: There will be a treatment effect on the delayed posttest.

11. Student Attitude Hypothesis

   H_3: There will be a treatment effect in student attitude for various levels of supplementary materials, i.e., student receiving more supplementary materials will indicate more appreciation than those students receiving less supplementary materials.

PROCEDURES

The procedures of the study are the actions that have been taken to implement the design. An important procedure involved the learners of the study. The learners used in the study were eight sets of ninth graders. These sets of learners were randomly placed into groups. Each group was

composed of two sets of students. Each group was ultimately composed of 44 to 46 students. Most of the procedures of the experiment have already been outlined in the Design Over time section of this chapter. The continuance of the procedures section gives additional detail on constructing the supplementary materials, and determining learning, a dependent variable of the study.

CONSTRUCTING THE SUPPLEMENTARY MATERIALS

As described in the Design Over Time section, the experimental treatment consisted of three catagories: First, exposure to supplementary materials; second, viewing an extant material; and third, completing the evaluative measures. The extant material, i.e., audio-visual production, was in existence before the time of the study. The audio-visual production was used as it came from the producer because that is the way an audio-visual production is normally used in the classroom. However, the supplementary materials and evaluative measures were modified for the study. Content for the supplementary materials was drawn from teacher manuals and textbooks used in the classroom, i.e., the text Outlooks Through Literature by Scott, Foresman and Company. The Overview, Instructional Objectives and Structured Notes were likewise adapted from the same resource materials, sources of which are contained in Appendix F.

The final version of the Overview, Instructional Objectives and Structured Notes (guided review) were reproduced for overhead projection which provided for a consistent presentation of all the supplementary materials, copies of which are contained in Appendices C, D, and E.

DETERMINING LEARNING AND ATTITUDE

Learning, as used in the study, refers to how much information was recalled after exposure to the audio-visual production and supplementary materials. The discussion here is primarily to explain how the cognition and attitudinal data of the subjects were secured.

To obtain the mean score for cognition and attitude, the subjects were first exposed to a twenty (20) question multiple-choice test immediately following their exposure to supplementary materials and an audio-visual production. The cognitive test was a modified version of the commercially produced test which accompanies all the textbooks with the title Outlooks Through Literature by Scott, Foresman and Company. Approximately thirty (30) days later the same cognitive test was administered to all the subjects. The attitude survey was administered following the second administration of the cognitive test.

SUMMARY

A posttest and delayed posttest, control design was selected to study the effects of the presence of supplementary materials when used with an audio-visual production. The use of a pretest was avoided so as not to sensitize the subjects to the experiment. The experimental treatments were designed to show the comparisons of cognitive tests' results between the groups. The attitudes of the three experimental groups were analyzed

for differences amongst the groups. Internal and external validity concerns were discussed. The study was conducted using a sample of ninth grade students from a high school in the mid-west. There were three treatment groups and one control group with 44-46 students in each group. Data were collected, coded, and computer analyzed using a one-way ANOVA.

IV ANALYSIS OF RESULTS

This chapter is divided into two major parts. The first part reports the findings of the study, and the second part discusses the findings. There are findings in two major areas: The student learning findings are reported first, followed by the findings concerning student attitude. The student learning findings, derived from the dependent variable learning, and the student attitude findings, derived from the dependent variable attitude, are each discussed in turn. In each case, the hypothesis is restated, and the summary data and associated ANOVA tables are given.

DEPENDENT VARIABLE - LEARNING

HYPOTHESIS I.

H_1: There will be a treatment effect on the immediate posttest.

The group means for learning on the immediate posttest are illustrated in Figure 4.1. The results of the one-way ANOVA are shown in Table 4.1.

TREATMENTS			
3 Aids	2 Aids	1 Aid	Control
15.023	15.909	14.283	11.773

DEPENDENT VARIABLE: LEARNING

H_1 O_1 IMMEDIATE POSTTEST

Figure 4.1

VARIABLE MATRIX OF MEANS

FOR: LEARNING

TABLE I: ANOVA FOR LEARNING: H_1O_1 IMMEDIATE POSTTEST

SOURCE	DF	MS	F
IMMEDIATE POSTTEST			
Between Groups	3	139.152	15.192 *
Within Groups	174	9.159	

* Significant at α =.10

In this analysis of variance test, the means differed as hypothesized, and the F ratio of 15.192 (df 3, 174) was significant at the α =.10 level, thus supporting this hypothesis. A Tukey-post hoc analysis revealed that for pairs of means to be different they must differ by 2.14

or more. Therefore, it may be concluded that all experimental groups learned more than the Control group (15.023, 15.909, 14.282 >11.777). The Three-Aid, Two-Aid, and One-Aid groups' differiential in learning was indistinguishable; however, all the groups differientials for learning were distinguishable from the Control group.

HYPOTHESES 2.

H_2: There will be a treatment effect on the delayed posttest.

The mean difference in learning between the four groups tested on the delayed posttest is illustrated in Figure 4.2. The results of the one-way ANOVA are shown in Table 2.

TREATMENTS			
3 Aids	2 Aids	1 Aid	Control
13.273	15.795	13.630	11.653

DEPENDENT VARIABLE: LEARNING

H_2 O_2 DELAYED POSTTEST

Figure 4.2

VARIABLE MATRIX OF MEANS

FOR: LEARNING

TABLE 2: ANOVA FOR LEARNING: H_2O_2 DELAYED POSTTEST

SOURCE	DF	MS	F
DELAYED POSTTEST:			
Between Groups	3	127.523	7.768 *
Within Groups	174	16.416	

* Significant at α =.10

The F ratio of 7.768 (df 3, 174) was significant at the α =.10 level. Thus, the data supported the hypothesis. In this analysis of variance test, the means differed as hypothesized.

A Tukey post-hoc analysis revealed that for pairs of means to be different they must differ by 2.86, or more. Therefore, it may be concluded that the Two-Aid group retained more information than the Control (No-Aid) group; (15.795>11.653). However, the Two-Aid group's differential of learning was not distinguishable from the Three-Aid and One-Aid groups, using the Tukey method.

STUDENT LEARNING FINDINGS

There was one learning dependent variable: learning. The treatments had an effect as tested by an ANOVA one-way analysis of variance. Both

hypotheses (H_1) and (H_2) were significant at the α =.10 level. The Tukey post-hoc test showed that all the experimental groups did better than the Control group on the immediate posttest. However, only the Two-Aid group did better than the Control group on the delayed posttest.

DEPENDENT VARIABLE - ATTITUDE

HYPOTHESIS 3.

H_3: There will be a treatment effect in student attitude for various levels of supplementary materials, i.e., students receiving more supplementary materials will indicate more appreciation than those students receiving less supplementary materials.

The participant's attitude was computed by totaling the scores, after reversing the scoring on the negatively stated items of the attitude survey (e.g. 5 became 1), to get an overall measure of attitude.

The mean differences in attitude required between the three groups were tested as illustrated in Figure 4.3. The results of the one-way ANOVA are shown in Table 3.

TREATMENTS		
3 Aids	2 Aids	1 Aid
2.295	2.207	2.31

DEPENDENT VARIABLE: ATTITUDE

H_3 O_3 DELAYED POSTTEST

Figure 4.3

VARIABLE MATRIX OF MEANS

FOR: ATTITUDE

TABLE 3: ANOVA FOR ATTITUDE: H_3 O_3 ATTITUDE SCALE

SOURCES	DF	MS	F
TREATMENTS:			
Between Groups	2	.143	.519
Within Groups	128	.276	

Not Significant at α =.10

In this treatment effect test, the means differed in the hypothesized direction, but the ratio of .519 (df 2, 143) was not significant at the α =.10 level, which does not support this hypothesis. Since the groups are not meaningfully different, the hypothesis does not warrant further discussion.

The student attitude findings stem from a single dependent variable measured by a student attitude survey. The purpose of the survey was to measure the subjects' reactions to the supplementary materials received during their learning experience. Perhaps the attitude survey would yeild significance if it were administered immediately after the first cognitive posttest rather than after the delayed cognitive post-test. The survey was administered after the delayed posttest because presenting it sooner could have sensitized the students to the study. Since the results were not significantly different, the data do not support the research hypothesis.

SUMMARY OF STUDENT LEARNING FINDINGS

The following is a summary of student learning findings resulting from this study:

Students learn more when supplementary materials are used in conjunction with the audio-visual productions than when only extant materials are used. On the immediate posttest, students exposed to Supplementary materials recall significantly more information than those students not exposed to supplementary materials, i.e., Instructional Objectives and Structured Notes. On the delayed posttest, the students exposed to two supplementary materials, i.e., Instructional Objectives and Structured Notes (guided review), retained significantly more information than those groups exposed to Three-Aids, One-Aid, and Control group (No-Aids). The

use of Overview does not seem to improve cognitive recall, in fact, it appears to be counter productive when used with Instructional Objectives and Structured Notes (guided review).

INTERPRETATION OF FINDINGS

The preceding portions of this chapter have presented a summary of the statistical findings of the experiment. The remaining part of the chapter interprets the meaning of those findings. The interpretation section is organized in the same order as the earlier findings section. Student learning interpretations come first.

INTERPRETATION OF STUDENT LEARNING FINDINGS

The following are interpretations of the findings related to student learning:

1. Students learn more when supplementary materials are used in conjunction with the extant materials than when only the extant materials are used.

2. On the delayed posttest, the students exposed to two (2) supplementary materials, i.e., Instructional Objectives and Structured Notes, retained significantly more information than the Control

group (No-Aids). This would seem a logical outcome since the Two-Aid supplementary materials pattern of presentation is the format followed by most speakers and preparers of information in general, i.e., tell them what you are going to do (Instructional Objectives), do what you said you would do (the audio-visual production); and then tell them what you have done (Structured Notes).

3. The Overview appears to be unnecessary, and probably counter productive when Instructional Objectives and Structured Notes (guided review) are used.

INTERPRETATION OF STUDENT ATTITUDE FINDINGS

Student attitude does not change significantly toward various forms of supplementary materials. Perhaps this is due in part to (1) the low reliability of the attitude survey, and (2) the inability of the students to have absolute differences in attitude, when they themselves were not comparing the supplementary materials. The lateness of the administration of the attitude survey probably effected the results the varied levels of supplementary materials had on student attitude.

SUMMARY

Chapter four has set forth the results of the data pertaining to this study. Hypotheses were restated with accompanying data presented. The chapter concludes with interpretations of findings and a summary of those interpretations. Hypothesis one and two were significant as hypothesized. Hypothesis three was not significant. The two relevant interpretations were: 1) Instructional Objectives and Structured Notes (guided review) significantly effect cognitive recall, and 2) student attitude is not significantly effected by the varied use of supplementary materials.

V SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter is divided into three major divisions: SUMMARY, CONCLUSIONS, AND RECOMMEDATIONS. The SUMMARY section reviews the Objectives And Procedures of the study. The CONCLUSIONS of the study are drawn directly from the findings of the study. The RECOMMENDATIONS section applies the implications of the conclusions to a Rationale For Recommendations, the Selection And Use Of Supplementary Materials and develops several Recommendations For Future Research.

SUMMARY

The study described in this research was designed to analyze the separate effects of adding supplementary materials when learning from an audio-visual production. The two dependent variables of concern were (a) cognitive learning, as measured by a cognitive test and (b) attitude, as measured by an attitude survey.

Four groups of ninth graders at a high school in the mid-west were selected as the target population for the research. Student's were

randomly assigned to one of three treatment groups, and a control group. The control group received only an audio-visual presentation (film). The treatment containing one supplementary material, i.e., Structured Notes (guided review), was sequenced so that the film was presented, and Structured Notes (guided review) provided. The treatment containing two supplementary materials, i.e., Instructional Objectives and Structured Notes (guided review), was sequenced the same as treatment one except for the addition of Instructional Objectives. The treatment containing three supplementary materials, i.e., Overview, Instructional Objectives, and Structured Notes (guided review), was sequenced so that Overview and Instructional Objectives were presented to the subjects, the film presented, and finally the Structured Notes (guided review). After each presentation sequence, a cognitive test was administered. Thirty days after the first cognitive test, the same cognitive test, and an attitudinal survey were administered.

Three hypotheses were generated and examined. These hypotheses tested (a) the mean difference in learning amongst the four groups used in the study, and (b) the mean difference in attitude amongst the three treatment groups of the four groups used in the study.

A posttest-only design was chosen over a pretest-posttest design because the posttest-only design generally has higher external validity than a similar pretest design. Also, the pretest can be reactive and sensitize the subjects. An analysis of variance was run using learning and attitude as dependent variables. All hypotheses were tested using Analysis of Variance (i.e., ANOVA) at the $\alpha = .10$ level.

OBJECTIVES AND PROCEDURES

The objective of this study was to compare the relative effectiveness of supplementary materials as supplied to students who were exposed to extant materials. The goal was to subject learners to various combinations of sequenced supplementary materials while holding the extant materials constant.

The primary research question was: Will using supplementary learning materials with extant materials result in improvement in student learning and attitude. An audio-visual production was chosen as the extant material primarily because of the increasing use of movies in education which has resulted in questions as to how to "best" utilize the extant materials in the classroom environment.

All four groups: Three-Aid, Two-Aid, One-Aid, and Control (No-Aids) watched a movie. After viewing the film, the students completed an immediate and a delayed cognitive test and all but the control group completed an attitude survey. The Three-Aid group received Overview, Instructional Objectives and Structured Notes. The Two-Aid group received Instructional Objectives and Structured Notes. The One-Aid group received Structured Notes. The Control (No-Aid) group received no supplementary materials. The supplementary materials never changed in format or content while the measures used remained the same for all learners at all times.

CONCLUSIONS

The following are the findings of the study:

Conclusion 1. The treatments had an effect as tested by an ANOVA one-way analysis of variance. This indicates students learn more when supplementary materials are used in conjunction with an audio-visual production than when only the audio-visual productions are used.

Conclusion 2. The Three-Aid group, Two-Aid group, and One-Aid group did better than the Control (No-Aid) group on the immediate posttest.

Conclusion 3. On the delayed posttest, the students exposed to two supplementary materials, i.e., Instructional Objectives and Structured Notes, retained significantly more information than the Control (No-Aids).

Conclusion 4. Student attitudes were not varied enough to be measurably significant.

RECOMMENDATIONS

The following RECOMMENDATIONS section discusses the application of supplementary materials as suggested by the above conclusions. For ease of reading and clarity of understanding, the section is presented in three parts: Rationale for Recommendations, Recommendation for Selection and Use of Supplementary Materials, and Recommendations for Future Research.

RATIONALE FOR RECOMMENDATIONS

Before any recommendations are made, it should be recalled that the primary objective of this study was to determine if supplementary materials made a significant difference in cognitive recall and student attitude toward learning.

Conclusions 2, 3, and 4 provide us with insight into the above question. These conclusions suggest that (A) when selecting supplementary materials, care should be exercised as to number and type of supplementary materials used, (B) selection and use of supplementary materials be wisely considered when longitudinal recall is desired, and (C) student attitude toward supplementary materials is not affected by more or less use of supplementary materials. Further, the data prompting conclusions 1 and 2 lead to the recommendation that some form of supplementary material be used in conjunction with extant materials; in this case, Instructional Objectives and Structured Notes (guided review) significantly increased cognitive recall.

RECOMMENDATION FOR SELECTION AND USE OF SUPPLEMENTARY MATERIALS

1. Because supplementary materials, i.e., Instructional Objectives and Structured Notes (guided review) had a significant effect on learner recall as indicated by this study, supplementary materials should be used in conjunction with an audio-visual production.

2. As indicated in one above, Instructional Objectives and Structured Notes (guided review) had a significant effect on learner recall; therefore, not only does it seem important that supplementary materials of some composition be used when instructing with an audio-visual production, but that instructional Objectives and Structured Notes (guided review) in particular be provided the learners.
3. Since the study was concerned with both immediate and delayed cognitive recall, and since the study results revealed that the use of the supplementary materials Instructional Objectives and Structured Notes (guided review) had a significant effect on learner recall, the logical recommendation is that Instructional Objectives and Structured Notes (guided review) be supplied for learners whose objective is to retain cognitive knowledge over an extended period of time.

RECOMMENDATIONS FOR FUTURE RESEARCH

The following recommendations are given in the form of implications and appear as logical extensions of this research:

1. Further research on the effect of supplementary materials when used in conjunction with extant materials should be done to support or contradict recommendation 4, which indicates Instructional Objectives and Structured Notes make a significant difference in both short and long-range cognitive

recall, while an additional Overview makes no positive contribution to learning.

2. Since educators, especially K-12 educators, are those who often use film as a media of instruction, it is recommended that they conduct research similar to this study. This would seem to provide direct and immediate input for classroom practices as related to audio-visual productions.

3. Because the producers of audio-visual productions presumably understand the goals and objectives of their productions, it seems logical that producers of audio-visual productions supply appropriate supplementary materials.

4. Further research is needed to determine how to prepare a student to indicate an attitude so the attitude expressed is meaningful; especially as the attitude relates to supplementary materials used with audio-visual productions.

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APPENDICES

APPENDIX A

COGNITIVE TEST

A TALE OF TWO CITIES

Multiple Choice:

Directions: Please indicate your answers by darkening the appropriate space on the answer sheet.

1. The plot of A Tale of Two Cities contains three strands: The Manettes, The Evremondes, and the revolutionaries. At what point do these strands become most critically entangled?

   A. Book the First
   B. Book the Second
   C. Book the Third
   D. Both Book the Second and Third

2. Dickens uses many contrasts. Two of the most striking are:

   A. The luxuary of the aristocrats and the squalor of the peasants
   B. Madame Defarge and the personalities of Darnay and Carton
   C. The differing views of Carton and his elderly Uncle
   D. The goodness of Lucie and the evil in Dr. Manette

3. The French Revolution demonstrates that:

   A. Only the truly guilty are harmed
   B. Revolutions nearly always produce peace loving nations
   C. Most revolutions are bloodless
   D. One extreme can produce another

4. Dicken's use of humor is shown in:

   A. The scene inwhich the word "BLOOD" is written on the wall
   B. The relationship between the unassuming Mr. Lorry and the powerful Miss Pross
   C. The mob scenes of both England and France
   D. Both A and B

5. Madame Defarge symbolizes:

   A. A contrast to her husband, Mr. Defarge

   B. The innocense of womankind during revolution

   C. The cold and hateful intelligence that forged the revolution

   D. The emotions of a fickle and blood thirsty mob

6. Dickens sympathizes with:

   A. The revolutionists

   B. The revolutionists but does not approve of their methods

1 C. The aristocrats

   D. Both B and C.

7. Madame Defarge is related to:

   A. The Manettes

   B. The Evremondes

   C. The Jacques

   D. Thr Darnays

8. On the way to the guillotine, Sidney Carton befriends:

   A. An old man

   B. A little seamstress

   C. A little boy

   D. A relative of Evremondes

9. Charles Darnay is accused of being:

   A. Traitor

   B. An Evremonde

   C. A thief

   D. A deserter

10. The two cities discribed in the movie were:

   A. New York and Chicago

   B. Paris and London

   C. Vienna and Strasbourg

   D. Rome and Berlin

11. The first target of the mob in Saint Antionie is

   A. The Bastille

   B. Foulan

   C. Tellson's

   D. The slum district

12. When the noblemen escape to England from France, they go directly to:

A. Tellsons
C. The country
B. The king
D. The U. S. A

13. Charles Darnay decides to go to Paris to help:

A. Gabelle
C. Mr. Jerry
B. Defarge
D. Jerry Cruncher

14. The pass words, "Recalled to Life" refers to":

A. Lucie Manette's bank account
B. Dr. Manettes death by fire
C. A plot to murder someone
D. Dr. Manette's escape from prison and eventual passage to England

15. Lucie Manette is:

A. Mr. Lorry's niece
C. Dr. Manette's daughter
B. Dr. Manette' granddaughter
D. Sidney Carton's sister

16. During Charles Darnay's first trial, he is being tried for:

A. Treason
C. Forgery
B. Murder
D. Grand Larceny

17. There is a significant resemblence between Charles Darnay and:

A. Mr. Lorry
C. Sidney Carton
B. Dr. Manette
D. Mr. Defarge

18. The peasant child is killed by:

A. The Marquis
C. Defarge
B. The King
D. The Jacques

19. Charles Darnay is really:

A. Lucie Manette's distant cousin

B. An Evremonde

C. A secret member of the Jacques

D. Both B and C

20. The Marquis's Evremonde is murdered by:

A. Gabelle

B. The Marquis' nephew

C. A jealous nobleman

D. An individual peasent Gaspard who is one of the "Jacques"

APPENDIX B

ATTITUDE SCALE

ATTITUDE SCALE

These statements refer to the content and sequence of materials in the TALE OF TWO CITIES packet.

With five (5) indicating your strongest feelings, please rank each of the following statements one (1) through five (5). Please assign a number to each category.

	SA	A	N	D	SD
1. The materials were not useful					
2. The materials I received were sufficient					
3. Using the materials made the teaching task more difficult than it needed to be.					
4. The materials I received were very good.					
5. I would like to see these kinds of materials used with other movies.					
6. The materials slowed me down.					
7. I should have had more materials.					

APPENDIX C

OVERVIEW

OVERVIEW OF A TALE OF TWO CITIES

IN THIS UNIT YOU WILL LEARN THAT:

DICKEN'S EXPLICIT SOCIAL IDEAS IN THIS NOVEL ARE RUDIMENTRAY. THEY AMOUNT TO NO MORE THAN THIS: THE FRENCH REVOLUTION WAS INEVITABLE BECAUSE ARISTOCRACY EXPLOITED AND PLUNDERED THE POOR UNTIL THEY WERE DRIVEN TO REVOLT. THUS, OPPRES- SION ON A LARGE SCALE RESULTS IN ANARCHY. AND ANARCHY IN TURN PRODUCES A POLICE STATE. ONE OF DICKEN'S STRONGEST CONVICTIONS WAS THAT THE ENGLISH PEOPLE MIGHT ERUPT AT ANY MOMENT INTO A MASS OF BLOODY REVOLUTIONISTS. IT IS CLEAR NOW THAT HE WAS MISTAKEN, BUT THE IDEA WAS FIRMLY PLANTED IN HIS MIND, AS WELL AS IN THE MINDS OF HIS CONTEMPORATIES. A TALE OF TWO CITIES WAS PARTLY AN ATTEMPT TO SHOW HIS READERS, ENGLISH NOBLEMEN, THE DANGERS OF A POSSIBLE REVOLUTION.

IF THE TERRORS OF REVOLUTION TAKE A POLITICAL FORM, THE HOPE THAT DICKENS HOLDS OUT IN THIS MOVIE HAS DISTINCT RELIGIOUS QUALITIES. IN A VERY BASIC WAY, A TALE OF TWO CITIES IS A STORY OF RESURRECTION. AND THE CENTRAL FIGURE OF THE STORY IS SYDNEY CARTON, WHO RE-INACTS FIGURATIVELY THE SACRIFICAL DEATH OF CHIRST. DICKENS PUTS THE CHRISTIAN DOCTRINE OF SALVATION ON A SECULAR BASIS, LEADING NOT TO AN OTHER-WORLDLY HEAVEN BUT TO THE SURVIVAL OF CARTON'S FRIENDS AND TO THE RESURRECTION OF SOCIETY.

APPENDIX D

INSTRUCTIONAL OBJECTIVES

INSTRUCTIONAL OBJECTIVES

AFTER VIEWING A TALE OF TWO CITIES YOU WILL BE ABLE TO:

1. UNDERSTAND THE ACTIONS, EMOTIONS AND MOTIVATIONS OF ELEVEN CHARACTERS
2. INTERPRET THE SYMBOLISM OF BLOOD, JACQUES, AND EVREMONDES
3. DESCRIBE AND APPRECIATE SEVERAL PLOT STRANDS, ESP., THE MANETTES, EVREMONDES, AND THE REVOLUTIONARIES
4. IDENTIFY TWO CAUSES OF THE FRENCH REVOLUTION
5. CONCEIVE OF HOW APPARENT PEACEFULNESS CAN TURN INTO THE HORRORS OF REVOLUTION
6. ENVISION THE POSSIBILITY OF CARING FOR SOMEONE ENOUGH TO DIE SO THAT THEY MIGHT BE HAPPY
7. LIST THE TWO CITIES
8. EXPLAIN THE "JACQUES" AND THEIR PART IN A TALE OF TWO CITIES
9. RECOGNIZE THE COMIC RELIEF AS SEEN IN THE RELATIONSHIP OF MR. LORRY AND MISS LUCIE MANETTE
10. APPRECIATE THE VIEWPOINT OF THE AUTHOR, CHARLES DICKENS

APPENDIX E

STRUCTURED NOTES

(GUIDED REVIEW)

STRUCTURED NOTES (GUIDED REVIEW) OF A TALE OF TWO CITIES

1. THE THREE GROUPS DEEPLY INVOLVED IN THE MOVIE ARE THE MANETTES, THE EVREMONDES AND THE REVOLUTIONARIES (JACQUES)
2. THE MOST STRIKING CONTRAST OF THE STORY IS THE LUXUARY OF THE ARISTO CRATS AND THE POVERTY OF THE PEASANTS (RICH AND POOR)
3. THE EXTREME CONDITION OF POVERTY CAN RESULT IN THE HORRORS OF REVOLUTION
4. COMIC RELIEF IS PROVIDED THROUGH THE CONTRASTING CHARACTERS OF LUCIE MANETTE AND MR. LORRY OF TELLSON BANK
5. MR. AND MRS. DEFARGE SYMBOLIZE THE COLD AND HATEFUL INTELLIGENCE THAT FORGED THE REVOLUTION
6. DICKENS, THE AUTHOR OF A TALE OF TWO CITIES, SYMPATHIZES WITH THE REVOLUTIONARIES, BUT DOES NOT AGREE WITH THEIR MEHTODS
7. SIDNEY CARTON IS A FRIEND TO MANY PEOPLE, BUT ESPECIALLY BEFRIENDS A LITTLE SEAMSTRESS AS SHE AND CARTON ARE TAKEN TO THE GUILLOTINE
8. CHARLES DARNAY, A FRIEND OF THE JACQUES AND HUSBAND OF LUCIE MANETTE, IS ULTIMATELY CHARGED AS AN EVREMONDE AND AN ENEMY OF THE PEOPLE. HE IS RESCUED BY SIDNEY CARTON
9. THE BASTILLE, OR PRISON WAS THE FIRST TARGET OF THE REVOLUTIONARIES
10. UPON LEAVING FRANCE, MOST NOBLEMEN FIRST WENT TO TELLSON BANK TO SETTLE FINANCIAL MATTERS
11. CHARLES DARNAY, THE NEPHEW OF THE MARQUIS EVREMONDE, RETURNS TO PARIS TO HELP A DEAR FRIEND, GABELLE
12. THE PHRASE, "RECALLED TO LIFE" REFERS TO DR. MANETTE'S ESCAPE FROM PRISON AND EVENTUAL PASSAGE TO ENGLAND
13. SIDNEY CARTON AND CHARLES DARNAY LOOKED SO MUCH A LIKE THEY MIGHT HAVE BEEN MISTAKEN FOR TWINS

APPENDIX F

SOURCES OF SUPPLEMENTARY MATERIALS

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