A STUDY OF RELATIONSHIPS AMONG SELECTED FACTORS AFFECTING MEDIA USE BY CLASSROOM TEACHERS WITHIN SELECTED SCHOOL SYSTEMS

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ABSTRACT

A STUDY OF RELATIONSHIPS AMONG SELECTED FACTORS AFFECTING MEDIA USE BY CLASSROOM TEACHERS WITHIN SELECTED SCHOOL SYSTEMS

by Charles Edward Streeter

This is an exploratory study developed from a concern that increasing amounts of audiovisual materials and equipment are being purchased by public schools, yet teachers do not make extensive use of these items.

The purpose of the study was to gather information that would be useful in planning educational media courses for pre-service and in-service training of teachers. The research focused on the relationships between specific teacher competencies in media and the frequency with which media are used in the classroom. And, in addition, relevant differences due to grade level taught, teachers' sex, years of teaching experience, and subject taught were analyzed for their effect upon a teacher's use of media.

To reduce the number of variables under consideration, the study was restricted to teachers in schools that have equipment, materials, and supporting personnel to facilitate teachers' use of educational media. Knowledgeable faculty

members from three Michigan universities recommended school districts they considered outstanding in the use of educational media. From their list of recommendations two school systems were arbitrarily selected; both agreed to participate in the study.

Recognizing that differences exist between schools in the same school district, each building was further screened by a building inventory which provided information about relevant environmental conditions.

The principal data gathering instrument was a questionnaire, filled out by the teachers, consisting of three parts: (1) personal and professional background, (2) competency in media, and (3) frequency of media use. To obtain the three dependent variables of the study--Media Competency Scores, Total Media Frequency of Use Scores, and New Media Frequency of Use Scores--responses to the teacher questionnaire were summed for each respondent. The statistics used in analyzing the data were correlation coefficient and one-way analysis of variance.

The main findings of the study are as follows:

1. There was a positive correlation (.41) between teachers' Media Competency Scores and Total Media Frequency of Use Scores.

2. The correlation coefficients between each of 47 media competencies and Total Media Frequency of Use Scores ranged from -.02 to .33.
3. There was no significant difference in Media Competency Scores due to the subject taught. But there was a significant difference in both frequency of use measures due to the subject taught.
4. Contrary to previous investigations, grade level taught, teachers' sex, and years of teaching experience do not appear to be important variables affecting frequency of media use.

The conclusions of this study can be concisely stated: a teacher's competence in media and the subject he teaches are important variables affecting frequency of media use.

The recommendations for teacher preparation suggest that because of the limitations of time, media competencies included in such programs must be selectively chosen. While noting that information for making objective selection is meager, the study recommends that efforts be made to establish a hierarchy in three categories of media competence. One group would include the media theory, utilization, selection, and evaluation competence that correlates positively with frequency of media use (this study suggests 12 such competencies). Another set should be made up of unique media competencies associated with particular subject matter areas.

And the third group would be the basic equipment operation and production competencies needed by teachers using media in today's schools.

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By

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CHAPTER I

THE PROBLEM

The Need for the Study

Until recent years audiovisual materials were considered as teaching "aids" and, as such, played a relatively minor role in the instructional process. Since the end of World War II, however, the field of instructional media has experienced steady growth and marked changes in both its nature and scope. This is a result, on one hand, of the many demands on education since Sputnik; on the other, a consequence of extensive developments in technology.

During World War II, when the military was called upon to train vast numbers of personnel in a variety of areas, it was clearly demonstrated that audiovisual equipment and materials could play a significant part in the instructional process. This was particularly true of motion pictures, recordings, models, and simulation techniques.

Following the war, the combined effects of population explosion, accelerating expansion of knowledge, and the shortage of qualified teachers created a tremendous logistic problem for the public schools. In addition, the quality of the schools' educational programs was being questioned as a

result of testing programs conducted with servicemen during the war.

The decade following the end of World War II found some educators and laymen calling attention to the possibilities of instructional technology for solving problems of time, space, and numbers; also for improving the learning situation. It was not until 1957, however, that the improvement of public schools became the focal point of the entire nation. This was the year that the Soviet Union launched its first satellite. First came the National Defense Education Act of 1958 which provided federal funds for upgrading mathematics, science, and foreign language courses. A portion of this money was to be used for purchasing audio-visual equipment and materials for classroom use in these specialized areas.

In 1959 the National Education Association established the Project on Instruction. "To this Project it gave a major task: Make thoughtful and creative recommendations to serve as a guide to the profession and the public in their combined efforts to study and improve the quality of the instructional program in the schools."[1]

The members of the National Education Association commission made 33 recommendations concerning the improvement of the schools. Five of them dealt specifically with the

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[1]Schools for the Sixties: A summary of the Report of The NEA Project on Instruction (Washington: National Education Association, 1962).

increasing importance of instructional media. The five media areas cited were the development of instructional materials centers, educational television, radio, programmed instruction, the improved use of printed and other instructional materials, and automation for storage and retrieval of pupil personnel data and instructional materials.[2]

In subsequent years Congress has continued and broadened categorical federal support to education. Some of the more significant legislative acts were the expansion of the National Defense Education Act to include almost all areas of the public school curriculum, the Elementary and Secondary Education Act of 1965, and the Higher Education Act. Pertinent to this study is the fact that practically all of the above legislation allocated money for the purchase of instructional materials and equipment.

In face of these developments, current evidence indicates a limited use of a wide variety of instructional media by a great segment of the teaching force. In 1961, Godfrey surveyed a sample of public school systems in the United States with respect to availability and use of audiovisual media. Her conclusions were

> that teachers . . . reported a high level of technical competence and knowledge of the field through either college work or in-service training. Most of them interested enough to suggest that schools rent or buy new materials or equipment. The basic equipment is

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[2] Ibid.

> available for their use in their own building. Yet the majority of them don't use audiovisual media extensively, nor do they plan to do so in the near future.[3]

While investigating the effect of different patterns of media training, Torkelson made findings that were similar to Godfrey's.

> Less than ten percent of the 228 visits recorded the use of any projected materials, with the greatest number of teachers using chalkboard and bulletin boards (85% and 61% respectively). All other materials on the Visitation Checklist were used by thirty-seven percent or less of the teachers.[4]

In a later paper, Torkelson reflects on the inconclusiveness of research in educational media usage and recommends several new avenues of investigation. One of his suggestions calls for more information in the "specification of teacher competencies in the use of media which can be tied to teacher behavior."[5] And it is the emphasis given to Torkelson's recommendation that makes the present study unique.

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[3]Eleanor P. Godfrey, Audio-Visual Programs in the Public Schools, Office of Education Contract No. SAE-9026, preliminary results (Bureau of Social Science Research, Inc., Washington, D. C., May 6, 1963), p. 20.

[4]Gerald M. Torkelson, An Experimental Study of Patterns for Improving the Preparation of Pre-Service Teachers in the Use of Audio-Visual Materials and of Effects on Pupils, National Defense Education Act, Title VII, Project No. 179 (The Pennsylvania State University, March, 1965), p. 150.

[5]W. C. Meierhenry (ed.), Media Competencies for Teachers, United States Office of Education, Contract No. 5-0730-2-12-6, Title VII (University of Nebraska, March, 1966), p. 185.

The Purpose of the Study

The purpose of the study is to identify elements in a teacher's training, personal character, and professional background that affect the frequency with which he uses educational media in the classroom. The focus of the research is to see if teachers who perceive themselves having competency in certain media skills and understandings will indicate greater use of educational media than those who do not see themselves as having these competencies. In addition, information about relevant differences in the personal and professional background of the teacher are analyzed for their affect on media usage.

Evidence from this research can be used in several ways. First of all, the study generates information that will be useful in planning in-service and pre-service teacher education programs. Another outcome is the genesis of a set of procedures and instruments that can be used by audiovisual coordinators to analyze and alter their public school media programs. And finally, the comprehensiveness of this report points to some critical areas in which further research is needed.

The two general questions this study attempts to answer are:

1. If facilities and equipment are available, is there a relationship between the kinds and number of media

competencies a teacher says he possesses and the frequency with which he uses media in the classroom?

2. What personal and professional characteristics of the teacher affect the frequency with which the teacher uses instructional media in the classroom?

The Hypotheses and New Explorations

Although the study as proposed was exploratory and hypotheses generating, one hypothesis was stated in the proposal:

H_1: There will be a positive correlation between the number of media competencies a teacher claims to possess and the frequency with which media are used in his classroom.

No other predictions were made in the research proposal, but the review of previous research together with a cursory inspection of the new data generated the following additional hypotheses:

H_2: If the factors of grade level taught (elementary and secondary) and sex are held constant, female elementary school teachers will use educational media more frequently than female secondary teachers and male elementary school teachers will use educational media more frequently than male secondary school teachers.

H_3: If teachers are divided into three teaching experience levels (0-5 years, 6-10 years, and 11

or more years), teachers in the group with the fewer years of experience will perceive themselves as possessing more competency in media skills and understandings than teachers who have had more teaching experience.

H_4: If teachers are divided into three teaching experience levels (0-5 years, 6-10 years, and 11 or more years), the teachers with the fewer years of experience will use educational media more frequently than the more experienced teachers.

Some literature asserts that the subject a teacher teaches is one of the best predictors of media usage. This same literature, however, fails to present much objective evidence concerning effect of subject matter taught upon a teacher's use of educational media. The report at hand follows the analysis of the above stated hypotheses with an exploratory examination of the relationships between subject matter taught and media usage.

And finally, to this writer's knowledge, no studies have attempted to relate teacher competency in specific media skills and understandings to teacher behavior: frequency of media usage. The concluding portion of the data presentation of this study is a set of tables and discussion of what appears to be a first look into the question of the correlation between a teacher possessing specific competencies and his frequency of media use.

Definition of Terms

This study employs the term "media" in the sense of those instructional materials and techniques used by teachers to supplement or substitute for traditional means of communication. The expressions educational media, instructional media, and audiovisual media are used interchangeably and refer to instructional materials and equipment ranging from still pictures and graphics to complex computer-based instructional systems.

The principal independent and sometimes dependent variable of the study, Media Competency Scores, refers to the number of specific skills and understandings associated with media that a teacher sees himself possessing. These scores were obtained by summing the responses to the 47 media competency items on the questionnaire administered to teachers participating in the study.

The two dependent variables, Total Media Frequency of Use Scores and New Media Frequency of Use Scores, are related in that the new media scores are a part of the total media scores. Total Media Frequency of Use Scores includes the use of all items measured on a questionnaire administered to teachers participating in the study, while the Newer Media Frequency of Use Scores delete the use of the traditional items such as chalkboard, teaching boards, models, objects, maps, globes, charts, and graphs. Respondents indicate on a scale how frequently they use each medium, and the scores are obtained by summing the frequency of use of each medium on the questionnaire.

The Plan of the Study

The design of the study is an exploratory investigation, and such studies according to Kerlinger have three functions: "to discover significant variables in the field situation, to discover relationships among variables, and to lay a ground work for later, more systematic and rigorous testing of hypotheses."[6]

One point that sets this study apart from previous research in the area of media usage is the attempt to identify relationships between specific media competencies held by a teacher and the frequency with which that teacher uses media in his teaching. Another unique feature of the study is the selection of subjects from school situations where equipment, materials, physical facilities, and personnel to facilitate the use of educational media are available and approximately equal. The first step in the selection process had faculty members from three Michigan universities recommend school systems in Michigan which they considered outstanding in the use of educational media. Two of the schools recommended were arbitrarily selected and asked to cooperate in the study: both agreed to participate.

Step two was an inventory of each school building with respect to media facilities: equipment, materials and personnel. This information was obtained by having the

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[6]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), p. 388.

building principal and/or audiovisual coordinator complete a questionnaire called the Building Inventory.

As a final check to ensure homogeneity of relevant environmental conditions, space was provided on the questionnaire filled out by the teachers to indicate deterrents to the use of educational media in his teaching situation.

The principal data--personal and professional characteristics of the teachers, competency in the use of educational media, and the frequency of use--were gathered from the selected elementary and secondary teachers by a questionnaire called the Instructional Media Survey. The questionnaires were distributed to all classroom teachers of the participating schools and 87.4 percent were returned.

The information from this teacher questionnaire was punched on IBM cards and sorted for central tendencies. This sorting process, the review of the literature, and hand calculated means of sample data generated additional hypotheses and areas of exploration. Most of the statistical computation and hypothesis testing was done using Michigan State University Agricultural Experiment Station library programs on the Control Data 3600 Computer.

CHAPTER II

REVIEW OF THE LITERATURE

Since this study gives particular emphasis to the relationships between teachers' competency in the use of educational media and the frequency with which they use media in the classroom, it is appropriate to devote a major part of this chapter to literature specifying media competencies for teachers. Thus, the first part of the literature review is devoted to studies specifying and/or presenting evidence for the selection of the educational media competencies a teacher should possess. The second section is a compendium of investigations that identify factors and patterns influencing the use of educational media. Because of overlap in scope, some research is cited in both sections, but each section treats a duplicated report in a different way.

Brief summaries are given at the end of each main section, and the concluding portion of this chapter summarizes and emphasizes findings relating specifically to the present study. It is the delineation of common threads and unique findings of other research that makes the findings and conclusions of this paper more meaningful.

Identification of Media Competencies

Studies associated with the specification of media competencies can be classified into two categories: groups specifying and developing lists of competencies teachers "ought" to possess and attitudinal studies attempting to measure teachers', supervisors', or media coordinators' opinion as to the utility of selected media understandings and skills.

The most recent attempt to systematically identify and list desirable media competencies for teachers was a United States Office of Education sponsored study coordinated and edited by W. C. Meierhenry.[1] The Meierhenry report--Media Competencies for Teachers, primarily a compilation of position papers by noted educational media specialists--was intended to re-assess and build upon previous works in the specification of media competencies. A resumé of the various positions taken in the above mentioned study makes up a major part of this section. Following the synopsis of Media Competencies for Teachers are brief summarizations of earlier works specifying media competencies and a few brief remarks that draw the section together.

While the various authors contributing to Media Competencies for Teachers write from different points of

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[1] W. C. Meierhenry (ed.), Media Competencies for Teachers, United States Office of Education, Contract No. 5-0730-2-12-6, Title VII (University of Nebraska, March, 1966).

view, it can be said by paraphrasing Meierhenry that the papers fit together and outline a meaningful program of teacher education.[2] Several elements contribute to the complemental nature of the various positions. First, the adherence of the writers to a common purpose: "to examine the implications of the use of media so far as teacher education programs were concerned."[3] And second, the writers' knowledge and awareness of two contemporary notions about teacher training: (1) teacher training models are developing that are learner and response oriented, and (2) there is no longer a clear line of demarcation between pre-service and in-service teacher education.[4]

In the condensation of each contribution to Media Competencies for Teachers no attempt is made to list all the competencies recommended by each writer, but specific competencies are cited as they contribute to understanding the writers' positions. Meierhenry, however, develops a list of media competencies summarizing the recommendations of the contributors. The summary is divided into three categories--conceptual and operation processes, theory, and basic conceptional and/or operational skills. His summary is included as a part of this chapter.

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[2] Ibid., p. 3.

[3] Ibid., p. 2.

[4] Ibid., p. 2.

The opening paper by Heinich[5] deals with instructional systems, teacher-media configurations, and the changing relationship between teachers and audiovisual materials. While the concept--audiovisual materials as an "aid" under complete control of the teacher--is firmly entrenched in public education, Heinich argues it is important for teachers to handle both media materials normally under the control of the classroom teacher and to develop skill working with a mediated teacher such as television teacher, writer of programed instruction, etc. In addition, he asserts, "Every student in pre-service training should be required to teach a substantial piece of his major field in mediated form."[6]

Norberg[7] follows with a plea for more emphasis upon theory and research. He contends teachers need not be capable of carrying on independent experimental research but must be able to interpret and apply the findings of experimentation in education from a background in disciplines that contribute to a liberal professional type of teacher education program. More specifically, he says,

> . . . the audiovisual process is a problem in presentation of instructional materials . . . . Thus, the theoretical background should be drawn from learning

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[5]Robert Heinich, "The Teacher in an Instructional System," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 7-30.

[6]Ibid., p. 28.

[7]Norberg, Kenneth, "Theoretical Background Required by Teachers in the Use of Newer Media," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 33-67.

> theory but also from communication theory and perception theory, at least, and the media dialogue probably ought to be philosophical rather than oriented to any specific discipline.[8]

A more practical approach is presented by Gerlach[9] as he stresses the importance of stating the learning task in behavioral terms and basing selection of audiovisual materials in terms of what one is trying to accomplish. Being stimulus-response oriented, Gerlach advocates a teacher being able to define the stimuli he wants to present and the reinforcing stimuli that follows emission of the desired response. Then, to select the appropriate medium, the teacher must also be familiar with the various stimulus characteristics of various media.

Curl[10] is preoccupied with the utilization of self-instructional systems for teaching the operation of audio-visual equipment. He stresses how rapidly knowledge about machines becomes obsolete and the importance of keeping teacher education programs up to date. While he has little to say about specific competencies a teacher should possess, he presents a table and discussion that illustrates the five stages in the changing role of the teacher: from one who

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[8] Ibid., p. 59.

[9] Veron S. Gerlach, "Selecting an Instructional Medium," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 70-100.

[10] David H. Curl, "Self-Instructional Laboratories for Teaching Operational Skills," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 104-124.

uses little or no media to one who is manager of the learning situation and relies almost exclusively on media. This perspective about the role of the teacher is necessary rationale for understanding the recommendation of certain competencies (e.g., ability to work with mediated teachers) and the use of self-instructional systems in education.

Kemp's[11] specialty is the production of audiovisual materials and he suggests that certain specialized production skills such as model building, plastic embedding, and sand table construction can be taught best as part of subject matter methods courses. He does, however, recommend a basic and optimal list of conceptual and manipulative skills that should be available in a general teacher education program. The majority of his recommendations are included in the summary list found near the end of this section.

As suggested in the introduction of this section, an important theme of Media Competencies for Teachers is utilization of self-instructional systems. Kemp follows this theme by paralleling Curl's paper and suggesting that many of the mechanics of media production can be taught through self-instructional systems.

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[11]Jerrold E. Kemp, "Identification of Pre-Service and In-Service Teacher Competencies in the area of Audiovisual Production Techniques," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 127-166.

A lengthy list of specific media competencies is presented in the paper by Torkelson,[12] but he focuses upon approaches and techniques used in developing teacher competency in the utilization of media. Torkelson suggests a total scheme for what the others have advocated in part: the utilization of self-instructional learning laboratories for the development of many of the desired media competencies. That is, we should look upon teacher-students as learners, determine the kinds of behavior we wish to have emitted, and provide through laboratories the resources which will make it possible for them to learn.

The final chapter "Media Competencies Needed by Teachers in 1966" by Meierhenry[13] summarizes the works of the various contributors by presenting a list of media competencies in three classifications: Conceptual and Operational Processes, Theory, and Basic Conceptual and/or Operational Skills. The complete list is as follows:[14]

Conceptual and Operational Processes (Cognitive)

I. To develop instructional objectives in behavioral terms followed by specification and arrangement of instructional stimuli upon which the desired behavior is contingent.

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[12] G. M. Torkelson, "Competencies Needed by Teachers in the Use of Newer Media and Various Approaches to Achieving Them," in W. C. Meierhenry (ed.), Media Competencies for Teachers, op. cit., pp. 169-211.

[13] W. C. Meierhenry, "Media Competencies Needed by Teachers in 1966," in W. C. Meierhenry, Media Competencies for Teachers, op. cit., p. 225.

[14] Ibid., pp. 225-229.

II. To gain knowledge about and experience with media so that their respective characteristics might be known. Such knowledge should help the designer of the instructional sequence to make acceptable intuitive judgements as to which medium used alone or in combination with other media will most effectively and efficiently produce desired behavior change. Where extant media are not available or where they do exist but require additional elaboration, experience in designing media in order to achieve the desired results should be provided.

III. To try out, analyze, critique, and modify a unit prepared and used with one or more learners possessing the psychological characteristics for which the unit was prepared.

IV. To have experience with instructional systems involving man-machine relationships. Television is likely the best medium for most prospective teachers although programed instruction or learning laboratories might be more suitable for certain content areas.

V. Actual experiences with the total range of instructional resources which are available in both substantive as well as professional areas of teacher education programs. The first-hand encounters with the media will enable each prospective teacher to judge the effectiveness of each medium.

Theory (Affective)

I. To understand the explosive growth of modern technology--particularly in communications and the storage and retrieval of information.

II. To be conversant with the impact of new technology upon education.

III. To understand the implications of learner-centered and response-oriented instruction.

IV. To have a thorough grounding in the psychology of learning, including orientation to various theoretical perspectives and corresponding lines of research in instructional techniques.

V. To understand the concepts of operations research and systems analysis as they have developed in the scientific study and management of military and industrial applications in education.

VI. To be acquainted with the various and conflicting strands of perception theory, and to have some grasp of the bearing of perception theory and research upon instructional procedures.

VII. To be acquainted with communication theory, its relationship to perception theory, and its use as a tool in the analysis of instructional problems.

VIII. To be acquainted with the broad scope of instructional research as related to the use of media, and its prominent underlying theoretical perspectives, such as experimental developments in linear programing as related to reinforcement theory, or recent research in cognitive developments testing and refining the theories of Piaget, Inhelder, Vygotski, etc.

IX. To understand and appreciate the limitations and conspicuous gaps in present instructional theory and research, such as the limited knowledge of the nature and function of iconic signs.

Basic Conceptual and/or Operational Skills
(Psycho-Motor)

Production of Audio-Visual Materials	Operation of Equipment
1. Using the chalkboard	1. 16mm projector
2. Cartooning and simple sketching	2. 8 mm silent and sound projector
3. Mounting pictorial materials	3. 35mm filmstrip and 2"x2" projector
4. Lettering	4. Overhead projector
5. Making displays	5. Opaque projector
6. Duplicating printed materials	6. Record player
7. Recording on tape	7. Tape recorder
8. Making transparencies	8. T. V. receiver
9. Motion pictures	9. Photocopier
10. Laminating pictorial materials	10. Still camera
11. Exhibits and models	11. Movie camera
12. Recordings	12. Scripting for Radio and TV
13. Radio	13. Program writing, editing and evaluation
14. Printed materials	14. Computer programing
15. Masters and paste-ups	

The remaining part of this section reports chronologically some earlier attempts to specify the necessary media competencies needed by classroom teachers. Many of these earlier works served as the foundation for the Meierhenry report.

One of the first attempts to identify objectively the skills and knowledges needed by teachers using audio-visual materials was a study published in 1946 by De Bernardis and Brown.[15] This study listed 23 different media competencies and asked 150 teachers, administrators, and supervisors to rate each competency with respect to importance to classroom teaching. The respondents rated items of utilization and selection as most important and placed little premium on mechanical and production competencies.

In 1947, the California State Department of Education[16] published a list of media competencies for teachers, and in 1957, David Pascoe[17] assessed the value of these standards by a questionnaire type survey. The questionnaire was designed on a weight ranking basis making it possible to establish the relative emphasis each respondent assigned to

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[15] De Bernardis, Amo and Brown, James W., "A Study of Teacher Skills and Knowledges Necessary for the Use of Audio-Visual Aids," Elementary School Journal, 46:550-56; June, 1946.

[16] California State Department of Education, "Developing Standards of Teacher Competency in Audio-Visual Education," California Schools, Vol. XVIII (1947), pp. 3-6.

[17] Results were summarized in "The Pascoe Report," Audiovisual Instruction, Vol. IV (1959), p. 607.

each competency. The results were obtained by ranking each competency; by percentages from three categories of respondents: audiovisual instructors in colleges and universities; audiovisual directors teaching audiovisual classes; and city, county, and district audiovisual directors. The composite ranking by topics is as follows:

Knowledges and Understandings

1. Principles of Use
2. Selection of Use
3. Types of Materials and Equipment
4. Sources of Materials and Equipment
5. Services of Audiovisual Department
6. Materials for Specialists
7. Production of Materials
8. Results of Research
9. Single School Services
10. Administering of Aids
11. History of AV

Skills and Abilities

1. Utilization
2. Selection
3. Evaluation of Use
4. Equipment Operation
5. Appraisal
6. Display
7. Production
8. Best Physical Conditions
9. Field Trips[18]

The summer after completing his study, Pascoe presented the findings at the 1958 Okoboji Audio-Visual Leadership Conference. According to Allen this conference devoted a major part of its time to pre-service preparation of

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[18]Results were summarized in the "Pascoe Report," Audiovisual Instruction, IV (1959), 607.

teachers in audiovisual competencies and developed a list of media competencies having the following objectives:

> Prime objectives of pre-service teacher education includes the development of visual mindedness, the stimulation of creative imagination and the encouragement of enlightened resourcefulness.[19]

A more definitive statement of the individual media competencies recommended by the Okaboji Conference delegates is presented in Allen's summary under two major classifications: Foundations, which subsume philosophical and psychological factors underlying the use of audiovisual materials, relationships to curriculum, characteristics of audiovisual materials, and desirable attitude; and Implementation Background, which includes the acquisition, evaluation, selection, and utilization of equipment and materials.[20]

Shortly after the Okoboji Conference, Phi Delta Kappan, January, 1959, published an article by Fulton and White titled "What Constitutes Teacher Competence in Audiovisual Communication?" The authors of that article suggest that all media competencies can be categorized under four headings: (1) proficiency in selection and evaluation of materials, (2) proficiency in production of simple instructional materials, (3) proficiency in the utilization of

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[19]William Allen (ed.), A Summary of the Lake Okoboji Audio-Visual Leadership Conferences 1955-1959 (Washington, D. C.: Department of Audio-Visual Instruction, National Education Association, 1960), p. 28.

[20]Ibid.

appropriated instructional materials, and (4) proficiency in preparation and use of facilities.[21]

In the process of developing objectives for a media course at the University of Georgia in the 1960-61 school year, Oliver surveyed 275 supervisors of practice teachers for their opinion regarding the importance of selected media competencies. His findings are summarized as follows:

> Specifically, supervising teachers thought that student teachers who came to them as prospective teachers should know how to select materials appropriate to the curriculum and how to use media effectively in their teaching. These competencies pre-suppose that beginning teachers should have a working knowledge of sources, procedures of use, the mechanical operation of equipment, and classroom conditions which contribute to effectiveness.[22]

Finally, Torkelson, as part of his study dealing with patterns of improving pre-service preparation of teachers, conducted a course inventory of 48 media competencies to which beginning teachers responded in terms of the "helpfulness" of the understanding or skill to their teaching. A rank order listing of responses is given below and will be referred to later in this paper.

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[21] W. R. Fulton and Fredrick A. White, "What Constitutes Teacher Competence in Audio-Visual Education?" Phi Delta Kappan, XL (1959), 159.

[22] G. E. Oliver, A Study of Pre-Service Teacher Education in the Use of Media of Mass Communication for Classroom Instruction, National Defense Education Act, Title VII, Project No. 130 (College of Education, University of Georgia, September, 1962), p. 73.

Rank Order of Items in Course Effectiveness Inventory

Item	Rank	Mean
Running motion picture projector	1	5.93
Threading filmstrip projector	2	5.73
Bringing real objects into class lesson	3	5.41
Running tape recorder	4	5.39
Understanding the role of materials in learning	5	5.30
Projecting materials properly	6	5.13
Designing bulletin boards	7	5.03
Helping pupils study materials with movies	8	5.02
Selecting the right materials for a given task	9	4.93
Recognizing good instructional materials	10	4.92
Knowing source catalogues for AV materials	11	4.90
Choosing instructional materials to fit the learner	12	4.88
Planning chalkboard use	13	4.79
Studying with pictures	14	4.78
Using diagrams to teach	15	4.77
Choosing a filmstrip for a given lesson	16	4.76
Clarifying a bulletin board idea	17	4.71
Performing a class demonstration	18	4.70
Visualizing a point to be learned	19	4.67
Ordering motion pictures	20	4.65
Preparing follow-up activities	21	4.63
Teaching with models	22	4.59
Providing yourself with flat pictures	23	4.54
Judging when to use a given material	24	4.53
Using a chalkboard	25.5	4.47
Using a recording	25.5	4.47
Teaching with an opaque projector	27	4.34
Taking a field trip	28	4.30
Tape recording materials for study	29	4.24
Mounting pictures	30	4.21
Using felt board materials for study	31	4.18
Recognizing when a recording is useful	32	4.13
Helping pupils use maps	33	4.09
Locating needed pictures	34	4.05
Using words	35	4.02
Recommending a classroom design for instruction	36	4.00
Helping colleagues use materials	37	3.91
Judging still pictures	38	3.88

Rank Order . . . (continued)

Item	Rank	Mean
Learning from graphs	39.5	3.83
Seeing an educational TV program	39.5	3.83
Keeping a study table in your classroom	41.5	3.79
Storing instructional materials	41.5	3.79
Cleaning projector lenses	43	3.68
Constructing overhead transparencies	44	3.66
Explaining your program to your parents	45	3.63
Changing projection lamps	46	3.55
Constructing mock-ups	47	3.36
Using puppets with students	48	3.34[23]

It is interesting to note the high rank given to the operation of equipment such as the motion picture projector (ranked 1) and tape recorder (ranked 4). Since this is a point that planners of audiovisual courses argue over perpetually, the findings reported in the above listing will be referred to again in the conclusions of the paper at hand.

In summary it appears the groups and commissions delineating media competencies for inclusion in teacher education programs dealt mainly with theoretical constructs of what "ought" to be taught and did not undertake to determine actual behavior patterns of teachers using audiovisual equipment and materials. The studies that attempted to gain empirical evidence as to the effectiveness of selected media competencies were mainly attitudinal studies, and as such,

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[23]Gerald M. Torkelson, An Experimental Study of Patterns for Improving the Preparation of Pre-Service Teachers in the Use of Audio-Visual Materials and of Effect on Pupils, National Defense Education Act, Title VII, Project No. 079 (The Pennsylvania State University, March, 1965), pp. 134-135.

were not designed to identify those competencies which in themselves might tend to influence teacher behavior with respect to media usage.

Factors Affecting Classroom Use of Media

There are few studies dealing directly with factors affecting the general use of instructional media. Most of the earlier and some of the more recent studies of use factors confine themselves to a single medium--particularly motion pictures. Contemporary findings with respect to media usage are usually concomitant results of research on a related question such as Torkelson's study on patterns of training program.

Two comparatively recent studies, Oliver's[24] reported in 1962 and Torkelson's[25] published in 1965, are deliberate attempts to measure the effect educational media training in the pre-service preparation of teachers has on the relevant behavior of practicing teachers. Nested in both of their reports are a number of findings pertinent to the investigation at hand.

Oliver's project was conducted in the 1959-62 period and involved 36 percent of the school systems in Georgia.

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[24]Oliver, op. cit.

[25]Torkelson, An Experimental Study of Patterns for Improving the Preparation of Pre-Service Teachers in the Use of Audio-Visual Materials and of Effect on Pupils, op. cit.

His concern was with the effect pre-service teacher preparation in media competency has upon a teacher's selection and utilization of media in the classroom. The basic guide for validating the curriculum of the project was a survey conducted among 275 supervisors of practice teachers. The survey assessed the supervisor's use of media, estimate of his competency in using media, and opinion with respect to certain phases of the teacher education program. Relevant findings in this part of Oliver's study are listed:

1. . . . elementary supervising teachers used all types more frequently than did secondary school teachers.

2. Supervising teachers who had been in the classroom teaching for a longer period tended to use the types of media considered in the project more frequently than those with less classroom teaching experience.

3. A relationship seemed to exist between the types of media used by supervising teachers and the subject fields in which they taught.

4. Competence in the use of media seemed to increase with the number of years of supervision.[26]

To determine the effectiveness of the teacher education program in the second phase of Oliver's study, two groups of teachers were compared: those who as students on the pre-service level had received the media training offered during the project at the University of Georgia, and those teachers who graduated from the University of Georgia between 1956-1959 and received no organized emphasis on

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[26]Oliver, op. cit., p. 72.

instructional media during their pre-service program. The teacher education programs were comparable except for this pre-service emphasis on instructional media. The findings do not indicate statistically significant differences in matters pertinent to the study at hand, but the following relevant tendencies are cited:

1. Subjects with training were more aware of media available to them individually as classroom teachers than subjects without such training . . . .

2. The group with training considered that a variety of media was more necessary to effective teaching than did those without training.

3. . . . those who had received training used media which required specific information and skill more frequently than did those of the control group with no pre- or post-graduation training.[27]

Data for the Torkelson project was gathered from the fall, 1959, to the end of spring, 1963, for the purpose of evaluating "the effect of four different patterns of instruction (separate course, integrated with methods, self-study, and student teaching) upon the performance of pre-service teachers to use audiovisual material and equipment.[28]

In phase one of the study comparisons were made between the four patterns of instruction based on results of evaluation test scores. The general results of this phase of Torkelson's study are listed below:

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[27] Ibid., p. 73.

[28] Torkelson, An Experimental Study of Patterns for Improving the Preparation of Pre-Service Teachers in the Use of Audio-Visual Materials and of Effect on Pupils, op. cit., p. 148.

> . . . all patterns of instruction resulted in a significant mean gain on the various measures between the pre- and post-testing periods.
>
> . . . no significant differences among patterns which would lead to the conclusions that one pattern was superior to all other patterns on all measures.
>
> There were spot differences among patterns at significant levels of probability.
>
> . . . the Self Study students did equally well, if not better than all other groups in learning equipment operation.
>
> In terms of attitudes toward the use of audiovisual materials and equipment in teaching, it appears that environment and motivation of self-instruction had a greater influence upon the students in the Self Study pattern than in the other patterns.[29]

The results of phase two of Torkelson's research are as follows:

> . . . there seemed to be a direct relationship between the fact of being an elementary teacher and higher scores on the Frequency of Use Inventory.
>
> . . . it appears that elementary teachers use traditional bulletin boards, record players, exhibits, and flat pictures more frequently than secondary teachers.[30]

Knowlton did a study dealing specifically with identification of components in the teaching situation that motivate or deter a teacher's use of educational media. His call for doing the study was that "many teachers . . . even when necessary facilities are readily available, use

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[29] Ibid., p. 149.

[30] Ibid., pp. 149-150.

instructional film infrequently or not at all."[31] And his purpose was to gain knowledge of the sort likely to enhance success of an information campaign urging increasing use of audiovisual resources.[32]

As suggested by his stated purpose, Knowlton's beginning concern was limited to studying the use of motion pictures. Later he modified his study to include educational media in general. Emphasis, however, was on motion pictures.

Throughout the progress of the study Knowlton found it necessary to make other modifications. Relevant to the present paper were his problems connected with the selection of schools. Originally he planned to investigate high schools that compared in size, facilities, and budget--but differed in the extent to which they effectively use audiovisual resources. The following quotation describes some of his barriers:

> . . . it became clear that the task undertaken was too large. It also became clear that differences that existed between pairs of high schools selected from the same district were differences due to factors extraneous to the purpose of the investigation.
>
> It seemed the lesser evil to give up the fruitless attempt to find contrasting pairs of schools within districts, and choose the two (presumably)

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[31] James Q. Knowlton, Studies of Patterns of Influence in the School Situation as They Affect the Use of Audiovisual Materials, National Defense Education Act, Title VII, Grant No. 7-12-029.00 (Division of Educational Media and Audiovisual Center, Indiana University, July, 1963), p. 1.

[32] Ibid., p. 1.

better-than-average high schools for the concluding interview effort.[33]

The investigator of the present study found somewhat similar problems in trying to come up with homogeneous environmental conditions for the subjects of this study. This problem will be discussed further in the chapter on procedures.

In spite of the emphasis Knowlton gave to the motion picture, the following findings are useful and pertinent to the discussion of this study:

1. . . . the well-informed teachers more than the poorly informed teachers tended to have positive attitudes toward the utility of instructional films.

2. Teachers of biology and general science use far more films than do teachers of physics, chemistry, or mathematics.[34]

3. . . . the tendency for a teacher to favor (or disfavor) Film was not a generalized tendency that would help one predict the teachers' probable acceptance of media in which he had little or no experience.

4. . . . it appears that teacher preferences for what we have called the "conventional media" are highly dependent upon the subject in which the teacher teaches.

5. . . . the subject taught--turned out to be a better predictor of frequency of usage than was attitude.

6. . . . the favorable attitude teacher who was an infrequent user simply faced greater utilization barriers than were faced by the favorable

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[33] Ibid., p. 5.

[34] Knowlton, op. cit., pp. 36-38.

attitude group whose membership was comprised of frequent users.[35]

Eleanor Godfrey[36] did a two-part study in which she assessed the availability and use of audiovisual media in a sample of public schools in the United States. The second part of her study, germane to the paper at hand, provided information on how extensively media resources were used by some 11,531 classroom teachers in 572 schools, in 247 school districts in all parts of the country during the 1961-62 school year. Her conclusions concerning factors affecting the teacher's use of media are indicated below:

> Most teachers . . . had been exposed to the various media in college or in in-service training . . . . Yet most of the teachers had not used any medium extensively, nor did they plan to do so in the near future.
>
> The most important variable related to the extent of a teacher's use of media was the subject he taught. Science, foreign language, and music were the only secondary subjects in which audiovisual materials were used on a regular basis. Elementary teachers, particularly those in the primary grades, were not only more likely to use some audiovisual materials, but to use it more frequently during the semester.
>
> Although poor classroom set-up, inadequate light control, and lack of time to prepare and preview materials were named as hindrances to effective use of audiovisual media by both teachers and administrators,

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[35] Ibid., pp. 86-89.

[36] Eleanor P. Godfrey, Audio-Visual Programs in the Public Schools, Office of Education Contract No. SAE-9026 (Bureau of Social Science Research, Inc., Washington, D. C., June, 1964).

> the inability to get enough good materials seems a more critical problem.[37]

A number of Pre-Sputnik studies--Hoban,[38] Imbrock,[39] Hite,[40] Meiser,[41] Hyer[42]--support in some degree or another the following as factors associated with classroom use of educational media: (1) teachers who have had training (in-service or pre-service) use more media in their teaching and use it more effectively, (2) the audiovisual coordinator plays an important role in the audiovisual program, (3) teacher inertia was an outstanding deterrent to film use, and (4) teachers who projected films in their classrooms, ordered films shortly before using, and who prepared some of their own materials were more frequent users of media.

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[37]Eleanor P. Godfrey, Audio-Visual Programs in the Public Schools-1962 Highlights of a National Survey (Bureau of Social Science Research, Inc., Washington, D. C., October, 1963).

[38]Charles F. Hoban, Jr., Movies That Teach (New York: Dryden Press, 1946).

[39]Paul H. Imbrock, "Pre-Service Education of Teachers in the Use of Audio-Visual Materials of Instruction" (unpublished dissertation, Indiana University, 1952).

[40]Herbert Hite, "A Study of Teacher Education Methods for Audio-Visual Competency in Washington--1937-1947" (unpublished dissertation, Washington State University, 1951).

[41]Holland O. Meiser, "An Exploration of Factors Affecting the Utilization of Audio-Visual Materials" (unpublished dissertation, Indiana University, 1952).

[42]Anna L. Hyer, "A Study of Possible Deterrents to Use of Motion Pictures with a School System Where Films and Facilities for Use Were Provided" (unpublished dissertation, Indiana University, 1952).

From the research cited in this section, three commonalities can be gleaned: (1) Elementary school teachers use educational media more frequently than do secondary school teachers. (2) Teachers with college training in the use of educational media are more aware and use more educational media than those who have not had such training. (3) There is a relationship between subject taught and the kind and amount of educational media used by classroom teachers. And, as will be discussed in the chapter summary, some of these generalizations are questionable.

Summary

The first section of this chapter, "Identification of Media Competencies," reports two kinds of studies: (1) groups of media specialists (e.g., Okoboji Audio-Visual Leadership Conference) who meet for the purpose of developing statements and lists of what media competencies should be included in teacher preparation programs, and (2) studies such as Pascoe's which gather opinions of educational media practicioners and establish a rank order of utility for the various competencies. Both categories reflect the logical and speculative judgements of knowledgeable people in the media field, and their recommendations can hardly be challenged since there is little experimental evidence to support or refute their viewpoints.

It is interesting, however, to note the lack of agreement in the recommendations of the media experts in the results of different opinionnaires sent to media practitioners. The recommendations of experts range from practical concern of machine operation to Norberg's point of view that " . . . teacher education, generally, simply does not provide the breadth and depth of theoretical orientation that would ensure a truly professional and scientific approach to the use of instructional materials."[43]

Similarly the summary of opinions reported in the Torkelson study rank the operation of some audiovisual machines quite high; yet De Bernadis and Brown found mechanical operation rated a lower position.

In view of the lack of experimental evidence to support the selection of any one or set of media competencies, it seems logical to accept the most recent expert recommendations, Media Competencies for Teachers, as a point of departure for those planning to gather evidence with respect to the effectiveness of selected media competencies.

Part Two, dealing with factors affecting the frequency of media use, supplies only a meager amount of information. While there is some consensus, a review of the literature leaves one with at least as many questions as answers. For example, there is general agreement that subject matter taught is an important variable affecting

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[43]Norberg, op. cit., p. 61.

frequency of media use, but none of the literature delves into the question of which media for a particular subject.

An analysis of the studies reported suggests only three generalizations common to all or almost all of the research:

1. Elementary school teachers use educational media more frequently than do secondary school teachers.
2. Teachers with college training in the use of educational media are more aware and use more educational media than those who have not had such training.
3. There is a relationship between subject taught and the kind and amount of educational media used by classroom teachers.

On the other hand, findings with less consensus suggest a number of other factors affecting media usage, some of which are in conflict among themselves and with the consensus generalizations. Pertinent findings of a minority of the research cited are listed below:

1. Among supervisors of practice teachers competency seemed to increase with years of experience.
2. Among supervisors of practice teachers media usage seemed to increase with years of experience.
3. Subject matter taught is a better predictor of media usage than is attitude.
4. Elementary school teachers used more flat pictures, models, and other traditional media, while secondary teachers use more projected materials.

5. Favorable attitudes toward the use of educational media can be stymied by utilization barriers.
6. Teachers who are trained and who are in situations where equipment is available still do not use media extensively.
7. Audiovisual coordinators play a significant role in audiovisual programs of the public schools.
8. Teacher inertia is an outstanding deterrent to the use of educational media.

Students of human behavior will recognize the complexity of trying to establish cause and effect relationships between specific variables of human activity and will not be surprised at the inconclusiveness of the information in the second section of this chapter.

Human organisms behave as a result of a myraid of forces that act and interact with the organism and with themselves, and as a result casual relationships are hard to identify. None the less the importance of technology to education today requires that we continue our effort to identify and subsequently to influence those factors affecting the teachers use or non-use of the learning resources at his disposal.

CHAPTER III

PROCEDURES AND LIMITATIONS

This paper reports an exploratory field study and, as such, describes what is rather than predicting relationships. The purpose of the study is to gain information about elements in a teacher's personal and professional background that positively or negatively affect the frequency with which the teacher uses educational media. Hopefully, such information may be useful in planning both in-service and pre-service teacher education programs.

In the thesis proposal one prediction was made: there will be a positive correlation between a teacher's competency in the use of media and the frequency with which he uses educational media. During the course of the study additional hypotheses associated with grade level taught, teaching experience, and training were generated. And, simultaneously, questions were raised as to the effect of subject matter taught and possession of specific media competencies upon the teacher's use of media.

Data for this study were gathered from teachers who taught in school systems considered outstanding in the use of educational media. Information about the schools in each

of these school systems was obtained by a building inventory questionnaire filled out by the principal and/or audiovisual coordinator. Relevant information about the teachers was obtained by an educational media survey questionnaire. See Appendix II.

To generate research ideas the information from the teachers was punched on IBM cards and sorted for central tendencies. From this sorting process additional hypotheses and areas of question were formulated to give direction to the study.

The statistics used in the analysis of data are correlation coefficients and simple one-way analysis of variance. The computation and hypothesis testing was done by use of the Michigan State University Control Data 3600 Computer.

Instrumentation

According to Ward and Henderson, "At present, since there is little useful evidence about what instructional variables are important, and even less evidence that any one way of getting descriptive data is better than another, there is really no reason not to copy, no reason not to adapt, and certainly no reason not to create."[1] The two data gathering

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[1] T. Ward and J. Henderson, "Guidelines for Building Teacher-Behavioral Research Instruments," Papers of the Institute #25, Learning Systems Institute, Michigan State University, 1966.

instruments used in this study are the results of all three--copy, adaptation, and creation.

Building Inventory

The Building Inventory is a counting and yes or no type response questionnaire that assesses the educational media facilitating conditions of each building: equipment, physical plant, supporting personnel, financial support, and production materials. The topics, style, and format used in this questionnaire are essentially an amalgamation of similar instruments found in the literature.

The first draft of the inventory schedule was examined by a group of educational media graduate students, suggestions made for improvement, and the instrument revised. The second edition of the inventory schedule was critiqued by knowledgeable faculty of the Michigan State University Instructional Media Center and again revised according to their recommendations. This revision constitutes the building inventory instrument used in this study. A copy can be found in Appendix I of this paper.

Instructional Media Survey

The instrument used to gather data from teachers concerning relevant aspects of their personal and professional background is titled Instructional Media Survey. This is a three part questionnaire. The first section deals with training, teaching experience, sex, subject and grade level

taught, and relevant room conditions; also a space is provided for teachers to indicate barriers to educational media use in their teaching situation.

The second part lists 47 media competencies and asks the respondent to circle the number before each item if he feels competent in that particular understanding or skill. The 47 competencies were gleaned from the Meierhenry Study[2] reviewed in Chapter II of this paper. Not all of the media competencies recommended in the Meierhenry report were included on this questionnaire and wording was often changed to make behaviorally stated objectives meaningful to the average classroom teacher. Media competency scores were obtained by totaling the number of competencies a teacher said he possessed.

The third part of the questionnaire assessed the frequency with which a teacher used various educational media. A lined scale (1 through 20) is provided to the right of each medium listed and the leacher is asked to indicate approximately how many times per month he uses each medium. This scale assumes twenty teaching days in a month. Total media frequency of use scores were obtained by summing the responses as described in the "Definition of Terms," in Chapter I of this study.

The first draft of the questionnaire was examined and analyzed by educational media graduate students and

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[2]Meierhenry, op. cit.

knowledgeable faculty members of the Michigan State University Instructional Media Center for validity of content and revised accordingly. The revised draft was tried out on 24 members of an off-campus audiovisual course composed of classroom teachers in South-Central Michigan. The trial respondents filled out the questionnaire in the presence of the investigator, reported ambiguity and suggested improvements.

Again, the questionnaire was modified as recommended. Another try-out was accomplished by having members of the first trial group, the off-campus audiovisual class, take questionnaires back to their schools and have fellow teachers respond to the questionnaire and write in the margin noticeable ambiguity and suggestions for change. Twenty-three questionnaires were returned indicating mainly mechanical errors. After making the suggested corrections and changes, the resulting form of the Instructional Media Survey was adopted for this study. A copy of this instrument together with the introductory letter can be found in Appendix II of this paper.

Selection of Subjects and Data Collection

As previously stated, the teachers participating in this study came from presumably equal and above average environmental conditions with respect to facilitating the use of instructional media. The initial step in the selection

process was to ask knowledgeable members of Michigan State University, Western Michigan University, and Wayne State University instructional media faculty to identify school systems in Michigan with outstanding media programs. From a list of such school systems recommended two or more times, two school systems were arbitrarily selected and asked to participate in the study. Both school systems agreed to cooperate in the study and together provided a maximum N of over 500 teachers. A copy of the letter sent by Dr. Charles F. Schuller, Director of the Instructional Media Center, Michigan State University, asking the schools cooperation can be found in Appendix III of this paper.

Each school system designated a project representative who met with the investigator to develop data collecting procedures and conduct local arrangements. It was agreed that all persons and schools participating in the study would remain anonymous. Henceforth, any reference to persons, buildings, or school systems connected with the study will be referred to by a number or a fictitious name.

The investigator and/or project representative met with the building principals to arrange the survey of the teachers and have the Building Inventory completed. The Building Inventory was filled out by the building principal and/or the audiovisual coordinator.

The building principals assumed responsibility for distributing and collecting the teacher questionnaires. Some

principals distributed the questionnaires via teacher mailboxes and asked to have them returned to a designated place. Others had the teachers fill out the questionnaire during a faculty meeting. The building principals returned all the Instructional Media Surveys and the Building Inventories to the project director who turned them over to the investigator.

Questionnaires to 594 teachers were distributed as follows: two high schools (181), four junior high schools (153), and 13 elementary schools (260). Of those distributed 519 or 87.4 percent were filled out and returned: high school (149), junior high school (118), and elementary school (252).

At this point another step was taken to ensure that there existed relatively equal facilitating conditions for media use by the teachers participating in the study. The results of the Building Inventory and pertinent parts of the Instructional Media Survey were summarized according to elementary or secondary school for the purpose of comparing the schools and eliminating dissimilar schools from the study. These summaries are found in Appendix IV, Tables 6.1 through 6.6.

As implied in the "Review of the Literature" this writer encountered a number of problems in trying to identify schools with equal environmental conditions. Originally it was planned to use as screening criteria the Department of Audiovisual Instruction's basic quantitative standards for

equipment. It was soon apparent that no school met all the standards and all schools exceeded the standards on many of the items but not on the same items. In addition to the above mentioned problem and a number of extraneous factors, it was found that Alpha and Beta school districts' financial budgets do not accurately, if at all, reflect the expenditures for non-book teaching materials thus eliminating another selection criterion. So, as a compromise, a modified selection guide was established as follows:

1. Elementary schools must be under the direction of a system-wide audiovisual coordinator.
2. Secondary schools must be under the direction of a full-time building audiovisual coordinator.
3. Comparisons of equipment inventories between elementary schools and between secondary schools should reveal relatively similar amounts of equipment available per teaching station.
4. School summaries of the teacher responses to deterrents to the use of media should not reflect a disproportionate number of equipment problems.

Using the above as a guide to subjective judgment it was decided that the elementary schools were homogeneous with respect to a facilitating environment for media use. Consequently all elementary school questionnaires, or 252, were retained in the study.

All secondary schools had approximately the same amount of audiovisual equipment available, yet one of the schools differed considerably from the others in several respects. Secondary school number five as listed in Tables 6.2, 6.4, and 6.6 was not under the jurisdiction of a district audiovisual coordinator nor did it have a full-time building audiovisual coordinator. In addition, 35 percent of the teachers in building number five indicated physical facilities as deterrents to using educational media and 26 percent indicated equipment problems as barriers to media usage. On the basis of these differences the questionnaires returned from secondary school number five (70 questionnaires) were excluded from the study.

This left 197 questionnaires from the secondary schools and 252 questionnaires from elementary schools, a total of 449. From this total seven secondary school questionnaires and six elementary school questionnaires had to be destroyed because either a complete questionnaire was not distributed to the teacher or the teacher filled out only a portion of the questionnaire. This left a final N for the study of 436, 190 secondary and 246 elementary.

Analysis of the Data

The three sets of data used as dependent variables in this study are Media Competency Scores, Total Media Frequency of Use Scores, and New Media Frequency of Use Scores.

These are the same scores described in the section titled "Instrumentation." The level of significance established for rejecting the null hypothesis in this study is .01.

The correlation statistic used to test the first hypothesis (concerning the correlation between media competency scores and frequency of media use scores) is the Pearson Product-Moment Correlation Coefficient.

> Correlation coefficients may be computed in various ways, depending upon the nature of the data. The most common is the Pearson Product-Moment Correlation Coefficient. Such a correlation coefficient takes into account not only the individual's position in the group, but also the amount of his deviation above or below the mean.[3]

The exploration of relationships between a teacher's possession of specific competency and this frequency of media use scores involves a dichotomous variable (having or not having the competency) and a continuous variable (Total Media Frequency of Use Score). The statistic used in this situation is the point biserial coefficient of correlation. As advocated by Edwards, the point biserial coefficient was computed using the formula for simple correlation with the dichotomous variable (yes or no) being assigned values of one or zero.[4]

The correlation coefficient is particularly useful as a descriptive statistic for the reasons stated by Hayes:

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[3]Anne Anastisi, Psychological Testing (New York: The Macmillan Company, 1954), pp. 103-104.

[4]Allen L. Edwards, Statistical Methods for Behavioral Sciences (New York: Holt, Rinehart and Winston, 1962), pp. 181-188.

"It is not necessary to make any assumptions at all about the form of the distribution, the variability of Y scores within X columns or arrays, or the true level of measurement represented by the scores in order to employ linear regression and correlation indices to describe a given set of data."[5]

To test the other three hypotheses of the study (concerned with the effect of grade level taught, training, and teaching experience upon frequency of use scores) and to explore the relationships between subject taught and frequency of media use scores, the F statistic computed by one-way analysis of variance is used. This versatile statistic allows one to test the differences between more than two means at the same time, thus providing a clear presentation of the relationship in a set of means. A description of simple one-way analysis of variance can be found in Kerlinger's recent book.[6]

The testing of hypotheses using analysis of variance assumes homogeneity of variance; that is, the variance within the groups is statistically the same. Kerlinger, however, in discussing the violation of assumptions says, "The evidence to date is that the importance of normality and homogeneity is overrated, a view that is supported by the author."[7]

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[5]William L. Hayes, Statistics for Psychologists (New York: Holt, Rinehart and Winston, 1963), p. 510.

[6]Kerlinger, op. cit., pp. 187-209.

[7]Ibid., pp. 258-259.

In the present study when analysis of variance is used, the assumption of homogeneity of variance is tested, and in some cases the assumption is violated. In cases where the assumption is violated the fact is called to the reader's attention so that he can interpret the findings in terms of his own beliefs.

The computation and hypothesis testing of the data was done using Michigan State University Agricultural Experiment Station library programs on the Control Data 3600 Computer. Explanations of the program routines and statistics involved are further explained in the following descriptive booklets: the correlation coefficient in **STAT Series Description No. 5**[8] and analysis of variance in **STAT Series Description No. 13**.[9]

Assumptions and Limitations of the Study

The recommendations growing out of the findings of this study are founded on two assumptions (based on the literature and the writer's experience) about teacher education:

1. Because educational media, properly used, play a vital role in the instructional process, instruction

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[8] "Calculations of Basic Statistics on **BASTAT** Routine," **STAT Series Description No. 5**, Agricultural Experiment Station, Michigan State University.

[9] "One-Way Analysis of Variance With Unequal Number of Replications Permitted (UNEQL Routine)." **STAT Series Description No. 13**, Agricultural Experimental Station, Michigan State University.

in media skills and understandings should be a part of pre-service teacher education.

2. The demands for the undergraduate student's time are so great that pre-service teacher education programs will not be able to require teacher candidates to take a separate audiovisual course.

This study has two major limitations. The first is the intrinsic weakness of field studies: because of the ex post facto character of field studies, causal relationships are weaker than in experimental research and they lack precision due to inadequate instrumentation.

Another limitation is that the findings of this study are generalizeable only to the extent that the teachers participating in the study are representative of other teachers in similar environments and the environments of Alpha and Beta school systems are representative of school systems with outstanding educational media programs.

CHAPTER IV

ANALYSIS AND RESULTS

A compilation of the findings of the study is reported in this chapter. These findings are presented under four topic headings describing the independent variables under discussion: (1) Media Competency, (2) Sex and Grade Level, (3) Teaching Experience, and (4) Secondary School Subject. Discussions of data follow the presentations of each set of findings, and the chapter concludes with a summary of all data presented.

Findings of the Study

Media Competency

The first hypothesis examined in this study has been stated:

H_1: There will be a positive correlation between the number of media competencies a teacher claims to possess and the frequency with which media are used in the classroom.

The following null hypothesis was tested:

H_{O_1}: There will be no correlation between a teacher's Media Competency Scores and his Total Media Frequency of Use Scores.

Symbolically: H_{O_1}: r = 0.

To determine the correlation between the two sets of scores the Pearson Product-Moment Correlation Coefficient was computed. The results were N = 436, r = .41, and F = 85.3 (.005). Using 1 and 435 degrees of freedom in the F Table, an F ratio of 6.69 is significant at the .01 level. The computer print-out indicates a significance level for the F ratio (85.3) as approximately .005. The null hypothesis is therefore rejected and evidence obtained that there is a positive correlation between a teacher's Media Competency Scores and his Total Media Frequency of Use Scores.

As a matter of exploration, the same test was done substituting New Media Frequency of Use Scores for Total Media Frequency of Use Scores. The results of this investigation were r = .39 at a significance level of .005. Contrary to the hunch of the investigator the two correlation coefficients (.41 and .39) did not differ substantially. Accordingly this phase of investigation was not pursued further.

Squaring the correlation coefficient (r = .41) of the first hypothesis results in the common factor variance .191. Using Kerlinger's interpretation of common factor variance we can say that approximately 19 percent of the variance in Total Media Frequency of Use Scores is accounted for by the variance in the Media Competency Scores.[1]

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[1]Kerlinger, op. cit., pp. 111-114, 201.

The establishment of competency as an important variable influencing the frequency with which a teacher uses educational media led to the exploration of two related areas: the effect of media training in college upon Media Competency Scores and the correlation of a teacher's competence in specific media skills and understandings with Total Media Frequency of Use Scores.

To explore the effect of college training on Media Competency Scores, one-way analysis of variance was used to test the following null hypothesis.

$H_{O_{1a}}$: No difference exists between mean Media Competency Scores of teachers grouped by having or not having had media training in college.

Symbolically: $H_{O_{1a}}: M_c = M_{nc}$

Summary data are given in Table 1.1, together with the table of analysis of variance.

An F ratio of 56.7 was obtained. An F ratio of 6.70 is required to reject the null hypothesis at the .01 level of significance. It is assumed that those with college training in media are more competent as a group than those who have not had such training in college.

While the means of the two groups do differ significantly and in the expected way--media training in college, 25.7, and without media training in college, 19.1--more than 16 percent of the teachers without media training in college had higher Media Competency Scores than one-half of those with

college training in media. To explain, about 16 percent of a normally distributed population lies one standard deviation above the mean; in the no-college-training group the mean score (19.1) plus one standard deviation (9.1) equals 28.2. The mean score of those with college training in media is 25.7.

Table 1.1. Summary of data and analysis of variance comparing Media Competency Scores for teachers having and not having had media training in college.

	College Training in Media	Without College Training in Media	
n:	276	160	
M:	25.7	19.1	
SD:	8.7	9.1	
Source	**df**	**s.s.**	**m.s.**	**F**
Between Groups	1	4423.7	4423.7	56.7 (.005)
Within Groups	434	33854.5	78.0	
Total	435	38278.2		

The other area of exploration, correlation of individual competencies with frequency of use, was examined by computing the point biserial correlation coefficient for each of the 47 media competencies making up the Media

Competency Score and the Total Media Frequency of Use Scores. A summary of these results and the percent of teachers possessing each competency can be found in Table 1.2. The relationships reported are not large, but because of the large number of observations (436) all correlation coefficients above .13 are significant at approximately the .005 level.

In discussing the findings of this section it should be pointed out that the correlation coefficient (.41) found in testing the first hypothesis is normally considered quite small. But when one considers the plethora of variables that probably have some effect on frequency of media use, a common factor variance of .191 appears quite meaningful.

Examination of the effect of media training in college upon Media Competency Scores reflected the following: (1) as a group teachers who have had media training in college have acquired more competency than those who have not had this formal training, and (2) media competency can be acquired on the job as well as in college classrooms. However, this information tells nothing about which competencies are best acquired on the job. It may be that the most critical competencies influencing media use are only acquired, or at least acquired more easily, in one place or the other.

The correlation coefficients between a teacher's possession of a specific media competency and his Total Media Frequency of Use Scores gives us some leads into which media competencies may be most influencial in bringing about wider

Table 1.2. Summary of data and correlation coefficients between individual Media Competencies and Total Media Frequency of Use Scores.

Competency	Correlation Coefficient	Percent Possessing Competency
Construct models, or build dioramas, or work with papier mache (one or more)	.33	63
Make and use such chalkboard aids as templates, disclosure devices, and opaque enlargements	.32	44
Design and arrange the learning space to most effectively use audiovisual materials	.31	49
Prepare materials for use with at least one type of "teaching board" (flannel, felt, magnetic, or hook and loop)	.31	71
Incorporate audiovisual materials as a part of the normal flow of classroom instruction	.30	77
Introduce and follow-up audiovisual presentations	.30	73
Acquire materials from one or more sources of free materials	.30	84
Select audiovisual materials on the basis of principles derived from learning and communication theories	.29	49
Produce programed instruction	.25	25
Explain the various roles media plays in the instructional process (record instruction, extend teacher, enhance learning)	.25	43
Specify the learning task in behavioral terms	.25	31
Evaluate the effectiveness of the use of materials in teaching	.25	68
Prepare learning space under varying conditions for optimum use of projected materials	.24	29

Table 1.2.--Continued

Competency	Correlation Coefficient	Percent Possessing Competency
Overcome audiovisual limitations through appropriate methodology and editing or restructuring the material	.24	30
Adapt audiovisual techniques to various sized groups of learners	.23	47
Store and maintain flat pictures, transparencies, etc.	.23	49
Prepare tape recordings that require only one voice	.22	67
Acquire audiovisual materials from sources available in the county or intermediate school district	.21	60
Recall unique characteristics of various types of audiovisual equipment	.21	51
Mount graphic and pictorial materials using rubber cement or dry mount tissue	.21	55
Acquire audiovisual materials from sources available at the state level (Universities, State Dept. of Education, etc.)	.20	59
Recall results of research studies which have implication for using audiovisual materials in teaching	.20	29
Set up and operate the tape recorder	.19	79
Set up and operate the 16mm motion picture projector	.18	75
Set up and operate the photocopier	.18	41
Acquire audiovisual materials from sources available in the local school district	.17	86
Set up and operate the overhead projector	.16	75

Table 1.2.--Continued

Competency	Correlation Coefficient	Percent Possessing Competency
Set up and operate the T. V. receiver	.16	44
Set up and operate the opaque projector	.16	81
Do cartooning and simple sketching	.15	44
Prepare transparencies using heat process (Thermo-fax) or a diazo (ammonia) process	.15	28
Prepare tape recordings that require dubbing from records or other tapes	.14	25
Perform simple maintenance techniques, such as replacing projection lamps	.14	41
Store and maintain films, filmstrips, and tape recordings	*.12	35
Set up and operate the filmstrip projector	.12	92
Prepare tape-slide instructional presentations	.11	17
Set up and operate the cartridge loading 8mm projector	.11	23
Prepare transparencies (single and overlay) using a marking pencil or felt pen directly on acetate	.10	52
Apply laminating film over mounted or unmounted flat materials	.10	17
Set up and operate a still camera	.09	71
Set up and operate the automatic slide projector	.08	69
Work effectively with a television teacher's presentation	.07	14
Set up and operate the motion picture camera	.05	41

Table 1.2.--Continued

Competency	Correlation Coefficient	Percent Possessing Competency
Set up and operate the record player	.04	97
Plan and prepare an instructional T. V. or radio program	.01	14
Plan and prepare an instructional film	-.002	10
Prepare photographic slides	-.02	17

*All correlation coefficients above .13 are significant at the .005 level.

use of educational media. Normally findings such as these, correlation coefficients ranging from .33 to -.02, are not considered worthwhile. Kerlinger, however, takes a different point of view and points out the importance of small correlation coefficients in exploratory studies such as this one.

> It has been said that it is inappropriate to bother with *r*'s of .10, .20, .30. With *r*'s of about .10 or less this point is well taken. But with *r*'s of about .30, the point is not well taken. If an *r* of .30 is statistically significant, it may help the investigator later to find an important relationship--if he can clear up, say, his measurement problems. That is, he might, be dropping a statistically significant *r* of .30, by losing a valuable lead to theory and subsequent research.[2]

[2] Ibid., p. 172.

Based on Kerlinger's opinion and considering coefficients of .25 and up as being around .30, we identify the first twelve competencies of Table 1.2 as possibly influencing the frequency of media usage in the classroom. Under the classifications recommended by Fulton and White[3] the twelve media competencies are listed below, together with the percent of teachers in this study that possess this competency.

Proficiency in Utilization

Incorporate audiovisual materials as a part of the normal flow of classroom instruction. (77%)

Introduce and follow-up audiovisual presentations. (73%)

Explain the various roles media plays in the instructional process (record instruction, extend teacher, enhance learning). (43%)

Specify the learning task in behavioral terms. (31%)

Proficiency in Selection and Evaluation

Acquire materials from one or more sources of free materials. (84%)

Select audiovisual materials on the basis of principles derived from learning and communication theories. (49%)

Evaluate the effectiveness of the use of materials in teaching. (68%)

Proficiency in Production of Simple Materials

Construct models, or build dioramas, or work with papier mache' (one or more). (63%)

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[3]Fulton, op. cit., p. 159.

Prepare materials for use with at least one type of "teaching board" (flannel, felt, magnetic, or hook and loop). (71%)

Produce programed instruction. (25%)

Proficiency in Preparation and Use of Physical Facilities

Design and arrange the learning space to most effectively use audiovisual materials. (49%)

Five of the 12 competencies that presumably contribute to an increased use of educational media are possessed by less than one-half of the teachers surveyed. We see in Table 1.2 that approximately two-thirds of the teachers have had some college training in media. Along these same lines it is interesting to note that the operation skills needed for use of familiar types of audiovisual equipment have low correlation coefficients with Total Media Frequency of Use Scores, .19 or less. Yet at least 75 percent of the teachers can operate each piece of equipment: tape recorder, 79%; 16mm projector, 75%; overhead projector, 75%; opaque projector, 81%; record player, 97%; and filmstrip projector, 92%. This should not be construed to mean that the operation of equipment skills are not important and this fact will be discussed later in Chapter V.

Sex and Grade Level

One of the consensus generalizations from previous studies is that elementary school teachers use educational media more frequently than secondary school teachers. Some

isolated studies imply this might be due to the sex factor or the preponderance of females in the elementary school. To clear up the question for this study the following hypothesis was generated:

H_2: If the factor of grade level taught (elementary and secondary) and sex are held constant, female elementary school teachers use educational media more frequently than female secondary school teachers, and male elementary school teachers use educational media more frequently than secondary school male teachers.

The following null hypothesis was tested:

H_{O_2}: No difference exists between mean Total Media Frequency of Use Scores for teachers grouped female-elementary and female secondary, or for teachers grouped male-elementary and male-secondary.

Symbolically: H_{O_2}: $M_{fe} = M_{fs}$

$M_{me} = M_{ms}$

To test the null hypothesis that there would be no difference in the Total Media Frequency of Use Scores due to grade level taught or sex, one-way analysis of variance was employed. Summary data are given in Table 2.1, together with the table of analysis of variance.

Table 2.1. Summary data and analysis of variance comparing Total Media Frequency of Use Scores: sex by grade level.

	Elementary Females	Secondary Females	Elementary Males	Secondary Males
n:	222	83	24	107
M:	56.8	43.4	60.9	43.8
SD:	25.6	30.3	20.7	23.9

Source	df	s.s.	m.s.	F
Between Groups	3	20057.1	6655.7	9.9 (.005)
Within Groups	432	290618.5	672.7	
Total	435	310675.6		

An F ratio of 9.9 was obtained. This is significant at the .005 level and the null hypothesis of no difference was rejected. The wide differences between means due to grade level taught--elementary-females 56.8, secondary-females 43.4, and elementary-males 60.9, secondary-males 43.8--supports the generalization that grade level taught influences the frequency with which a teacher uses educational media. The very slight differences due to sex--elementary-females 56.8, elementary-males 60.9 and secondary-females 43.4, secondary-males 43.8--indicates sex as not an important variable influencing the frequency of media use.

A test of the above null hypothesis except substituting New Media Frequency of Use Scores revealed that the use of new media was not influenced by a teacher's sex or grade level taught. Summary data are given in Table 2.2, together with the table of analysis of variance.

Table 2.2. Summary of data and analysis of variance comparing New Media Frequency of Use Scores: sex by grade level.

	Elementary Females	Secondary Females	Elementary Males	Secondary Males
n:	222	83	24	107
M:	14.7	16.0	20.1	14.1
SD:	11.1	15.8	12.9	14.7

Source	df	s.s.	m.s.	F
Between Groups	3	806.4	268.8	1.6 (.20)
Within Groups	432	74571.9	172.6	
Total	435	75378.3		

An F ratio of 1.6 was obtained. An F ratio equal to or greater than 4.65 is required to reject the null hypothesis at the .01 level of significance. Therefore, it can be assumed that neither a teacher's sex nor the grade level he teaches influences the frequency with which new media are used.

The evidence presented in this part of the chapter lends some support to the commonly held assumption that elementary school teachers use more media than secondary school teachers. It also refutes the notion that a teacher's sex influences the frequency with which he uses educational media. The important finding of the section is that when the traditional classroom media--chalkboard, flannel board, models, etc.--are excluded, neither a teacher's sex nor the grade level he teaches significantly affects the frequency with which he uses educational media. This subject will be considered again under the effect of subject taught.

Teaching Experience

Some research literature suggests that the more experienced teachers are more competent in media usage and use them more frequently than the less experienced teachers. A cursory examination of the data of this study generated two opposite hypotheses. The first of these hypotheses has been stated:

H_3: If teachers are divided into three teaching experience levels (0-5 years, 6-10 years, and 11 or more years), teachers in the groups with the fewer years of experience will perceive themselves as possessing more competency in media skills and understandings than the teachers who have had more teaching experience.

The following null hypothesis was tested:

H_{O_3}: No difference exists between mean Media Competency Scores of teachers grouped by years of teaching experience: 0-5 years, 6-10 years, and 11 or more years.

Symbolically: $M_{O-5} = M_{6-10} = M_{11+}$

To test the null hypothesis that there would be no difference in Total Media Competency Scores due to years of teaching experience, one-way analysis of variance was used. Summary data are given in Table 3.1, together with the table of analysis of variance.

Table 3.1. Summary of data and analysis of variance comparing Media Competency Scores by years of teaching experience.

	0-5 Years Experience	6-10 Years Experience	11 or More Years Experience
n:	202	112	122
M:	23.7	24.5	21.4
SD:	8.8	9.4	10.1

Source	df	s.s.	m.s.	F	
Between Groups	2	631.8	315.9	3.6	(.03)
Within Groups	433	37646.5	86.9		
Total	435	38278.2			

An F ratio of 3.6 was obtained. An F ratio of at least 4.66 is required to reject the null hypothesis at the .01 level of significance. Therefore, it is assumed that a teacher's competency in the use of educational media is not influenced by his years of teaching experience.

The fourth hypothesis examined in this study is stated:

H_4: If teachers are divided into three teaching experience levels (0-5 years, 6-10 years, and 11 or more years), the teachers with the fewer years of experience use educational media more frequently than the more experienced teachers.

The following null hypothesis was tested:

H_{O_4}: No difference exists between Total Media Frequency of Use Scores of teachers grouped by years of teaching experience: 0-5 years, 6-10 years, and 11 or more years.

Symbolically: $M_{0-5} = M_{6-10} = M_{11+}$

To test the null hypothesis that there would be no difference in Total Media Frequency of Use Scores due to years of teaching experience, one-way analysis of variance was used. Summary data are given in Table 3.2, together with the table of analysis of variance.

An F ratio of .99 was obtained. An F ratio of at least 4.66 is required to reject the null hypothesis at the .01 level of significance. Therefore, it is assumed that

the frequency with which teachers use all educational media is not affected by their years of teaching experience.

Table 3.2 Summary of data and analysis of variance comparing Total Media Frequency of Use Scores by years of teaching experience.

	0-5 Years Experience	6-10 Years Experience	11 or More Years Experience
n:	202	112	122
M:	52.8	51.5	48.5
SD:	25.1	27.2	28.8

Source	df	s.s.	m.s.	F
Between Groups	2	1416.3	708.2	.99 (.37)
Within Groups	433	309259.3	714.2	
Total	435	310675.6		

To test the possibility that younger teachers might be more inclined to use the newer media than the more experienced teachers, the immediately preceding hypothesis was tested substituting New Media Frequency of Use Scores for Total Media Frequency of Use Scores. Summary data are given in Table 3.3, together with the table of analysis of variance.

An F ratio of 2.2 was obtained. An F ratio of at least 6.66 is necessary to reject the null hypothesis at the .01 level of significance. Therefore, it is assumed that

the frequency with which a teacher uses the newer media is not affected by years of teaching experience. It should be pointed out, however, that the trend of the mean scores--16.2, 15.5, and 13.1--seem to favor the less experienced teacher using the new media more frequently than the more experienced.[4]

Table 3.3 Summary data and analysis of variance comparing New Media Frequency of Use Scores by years of teaching experience.

	0-5 Years Experience	6-10 Years Experience	11 or More Years Experience
n:	202	112	122
M:	16.2	15.5	13.1
SD:	13.0	14.0	12.6

Source	df	s.s.	m.s.	F
Between Groups	2	755.9	377.9	2.2 (.11)
Within Groups	433	74622.4	172.3	
Total	435	75378.2		

The results of this section indicate that for this particular group of teachers, years of teaching experience does not bear upon Media Competency Scores nor the Frequency

[4]Homogeneity of variance assumption is violated. The obtained F ratio of 8.9 exceeds the required F ratio of 2.53.

of Use Scores. When considering only the New Media Frequency of Use Scores, no significant differences were obtained, but a visual inspection of the mean scores suggests a trend in favor of the younger teachers. This may be due to several factors: (1) younger teachers have grown up surrounded by mechanical devices of all kinds and thus have less reservation about using them, and (2) teachers tend to teach as they are taught and younger teachers may have experienced more instruction utilizing the newer media. But in general it can be said that years of experience is not an important variable affecting media usage.

Subject Taught

To start exploring the relationships of the various secondary school subjects and frequency of media usage, it was decided to first compare the teacher's Media Competency Scores with respect to subject taught. To examine this question, one-way analysis of variance was again used to test the null hypothesis:

H_{O_5}: No difference exists between the mean Media Competency Scores for secondary school teachers grouped by subject taught: foreign language, English-social studies, math-science, social studies, science, industrial arts, mathematics, English, business education, unclassified subjects.

Symbolically: $M_{fl} = M_{ss} = M_{ia} = M_{es} = M_{m} = M_{e} = M_{be} = M_{u}$

Summary data are given in Table 4.1, together with the table of analysis of variance.

Table 4.1. Summary data and analysis of variance comparing Media Competency Scores by secondary subject taught.

Subject	n	M	SD
Industrial Arts.....	9	31.9	8.7
Math-Science.....	18	24.0	10.5
English-Social Studies..	22	23.0	10.5
Science.....	16	22.8	9.2
Social Studies.....	30	22.4	9.3
Business Education.....	10	21.8	14.8
Unclassified.....	38	20.9	10.6
English.....	24	20.5	9.5
Foreign Language.....	3	20.0	9.0
Mathematics.....	20	17.9	8.3
Total.....	190	22.0	10.2

Source	df	s.s.	m.s.	F
Between Groups	9	1471.2	163.5	1.6 (.11)
Within Groups	180	18225.6	101.3	
Total	189	19696.7		

An F ratio of 1.6 was obtained. An F ratio of at least 2.51 is required to reject the null hypothesis at the .01 level of significance. Therefore, it is assumed that the teachers in all subject matter areas had the same level media competency.

A commonality from previous research is that subject matter taught is an important influence upon frequency of media use, but at the same time little evidence is provided for predicting which subjects bring about more frequent use of media. Again, to explore this area analysis of variance was used to test the following null hypothesis:

H_{O_6}: No difference exists between the mean Total Media Frequency of Use Scores for secondary school teachers grouped by subject taught: foreign language, English-social studies, math-science, social studies, science, industrial arts, mathematics, English, business education, and unclassified subjects.

Symbolically: $M_{fl} = M_{es} = M_{ss} = M_s = M_{ia} = M_m = M_e = M_{be} = M_u$

Summary data are given in Table 5.1, together with the table of analysis of variance.

An F ratio of 5.1 was obtained which is significant at the .005 level. Therefore, it is assumed that the subject taught is an important influence upon frequency of media use.[5]

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[5]Homogeneity of variance assumption is violated. The obtained F ratio of 8.9 exceeds the required F ratio of 2.53.

Table 5.1. Summary data and analysis of variance comparing Total Media Frequency of Use Scores by secondary subject taught.

Subject	n	M	SD
Foreign Language.....	3	84.0	17.3
English-Social Studies...	22	59.5	27.4
Social Studies.....	30	51.2	22.5
Math-Science.....	18	49.3	26.7
Unclassified.....	38	46.2	34.5
Science.....	16	42.4	16.0
Industrial Arts.....	9	38.1	24.0
Mathematics.....	20	34.2	12.9
English.....	24	26.6	11.5
Business Education.....	10	20.7	27.2
Total.....	190	43.6	26.8

	df	s.s.	m.s.	F
Between Groups	9	27295.1	3032.8	5.1 (.005)
Within Groups	180	108586.6	603.3	
Total	189	135881.7		

The final investigation of this study was to test the above null hypothesis substituting New Media Frequency of Use Scores for Total Media Frequency of Use Scores. A

summary of data can be found in Table 5.2, together with the table of analysis of variance.

Table 5.2. Summary data and analysis of variance comparing New Media Frequency of Use Scores by secondary subject taught.

Subject	n	M	SD
Foreign Language.....	3	51.7	15.1
English-Social Studies..	22	21.0	12.7
Unclassified.....	38	18.2	21.9
Math-Science.....	18	17.8	13.6
Social Studies.....	30	16.8	12.7
Science.....	16	11.1	8.1
English.....	24	9.7	7.8
Business Education.....	10	9.0	13.9
Industrial Arts.....	9	9.0	9.9
Mathematics.....	20	6.4	6.0
Total.....	190	14.9	15.2

Source	df	s.s.	m.s.	F
Between Groups	9	8555.1	950.6	4.9 (.005)
Within Groups	180	34947.5	194.2	
Total	189	43502.6		

An F ratio of 4.9 was obtained which is significant at the .005 level. It is assumed that subject matter taught influences frequency of new media use.[5]

Any discussion of the effect of the subject taught on media use should emphasize in the beginning that the test of the first hypothesis established no significant difference in Media Competency Scores due to subject taught. This point is important in view of the significant correlation coefficient (.41) between Media Competency Scores and Total Media Frequency of Use Scores. It can now be assumed that findings of significant differences in both Total Media Frequency of Use Scores and New Media Frequency of Use Scores due to subject taught were not unduly influenced by differences in media competency.

A close inspection of the distribution of Total Media Frequency of Use Scores shows teachers assigned combinations such as math-science or English-social studies had higher scores (49.3 and 59.5 respectively) than teachers assigned only one of the subjects: mathematics, 34.2, science, 42.2, English, 26.6, and social studies, 51.2. This observation, while not objective, adds support to the findings that the subject taught affects the amount of media use.

Another comparison of means, Total Media Frequency of Use Scores, indicates that teachers of some secondary

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[5]Homogeneity of variance assumption was violated. The obtained F ratio of 7.8 exceeds the required F ratio of 2.53.

subjects have mean frequency of use scores comparable to those of the elementary teachers. The comparable scores are foreign language, 84.0, English-social studies, 59.5, and social studies, 51.2; the elementary teachers' mean scores were: males, 60.9 and females, 56.8. This subjective analysis suggests that the earlier differences between elementary and secondary school teachers were due to the wide array of subjects taught in the elementary school and not to grade level taught.

It is also interesting that New Media Frequency of Use Scores due to subject taught were significantly different, while the comparisons of the same scores by grade level did not reveal significant differences.

In summation, it can be said that the subject taught is a more important variable affecting frequency of media use than either Media Competency Scores or grade level taught.

Summary of Results

This study listed four hypotheses for examination and, in addition, conducted several exploratory investigations in areas related and not related to the stated hypotheses. The first hypothesis dealt with the relationship between media competency and frequency of media use. The null hypothesis was rejected at the .01 level of significance and evidence obtained that there is a correlation (.41) between a teacher's competency in media and his frequency of media use.

An exploratory investigation tested the null hypothesis that there would be no difference between Media Competency Scores of teachers grouped by having or not having had media training in college. The null hypothesis was rejected and evidence obtained that college training in media resulted in higher Media Competency Scores. An examination of the distribution of the Media Competency Scores revealed that more than 16 percent of the people without media training in college had scores above the average of those teachers that had such training in college. This inspection of score distribution suggests that media competency can be acquired on the job as well as in the college classroom.

Another exploration dealt with the relationship of a teacher's competence in specific media skills and understanding and his frequency of media usage. By computing the correlation coefficients between a teacher's possession of 47 different media competencies and frequency of use scores, 12 correlation coefficients of around .30 were discovered. In terms of an exploratory study, correlation coefficients of around .30 can be considered important leads to possible relationships.

The second substantive hypothesis was concerned with the effect of grade level taught and a teacher's sex upon frequency of media use. The null hypothesis was rejected at the .01 level of significance and evidence obtained that elementary school teachers had higher Total Media Frequency

of Use Scores than their counterparts in the secondary school. This same test also indicated that a teacher's sex was not a factor influencing frequency of media use. However, when New Media Frequency of Use Scores were used as the dependent variable, no significant differences were found as a result of a teacher's sex or grade level taught.

The third and fourth substantive hypotheses looked into the effect of years of teaching experience upon a teacher's competency in media and his frequency of media use. No evidence was found to support a belief that years of teaching experience had any effect upon either competency in media use or in frequency of media use.

Exploratory investigations into the effect of secondary school subject taught upon a teacher's competence in media and his frequency of media use indicated no significant difference in Media Competency Scores among the teachers of the various secondary school subjects. But significant differences were discovered in both Total Media Frequency of Use Scores and New Media Frequency of Use Scores due to the secondary school subject taught. This same exploration also revealed that teachers of some secondary subjects had Total Media Frequency of Use Scores equivalent to those of the elementary school teachers. These findings suggest that subject taught is a more important variable affecting frequency of media use than either media competency or grade level taught.

CHAPTER V

SUMMARY AND CONCLUSIONS

Recapitulation

The purpose of the study is to gather information that will be useful in planning educational media courses for pre-service and in-service training of teachers. The focus of the investigation is to discover relationships between specific teacher competencies in media and the frequency with which media are used in the classroom. In addition, relevant differences in personal and professional characteristics of teachers are analyzed for their effect upon the teacher's use of media.

The plan of the study was to do a questionnaire survey of teachers in schools that have equipment, materials, and supporting personnel available to facilitate the teachers' use of media. School systems were selected as a result of recommendations from knowledgeable faculty of three Michigan Universities. The schools were further screened by a building inventory which provided information about relevant environmental conditions. The teachers were asked to fill out a three-part questionnaire: (1) personal and professional

background, (2) competency in media skills and understandings, and (3) frequency of media use.

To generate research ideas, the information from the teacher questionnaire was punched on IBM cards and sorted for central tendencies. The three dependent variables used in hypothesis testing were Media Competency Scores, Total Media Frequency of Use Scores, and New Media Frequency of Use Scores. These scores were obtained by summing responses on the teacher questionnaire.

The statistics used in the analysis of the data are correlation coefficients and simple one-way analysis of variance. The computation and hypothesis testing was done using the Control Data 3600 Computer.

The findings of the study are as follows:

1. There was a positive correlation (.41) between teachers' Media Competency Scores and Total Media Frequency of Use Scores.
2. Teachers with media training in college had significantly higher Media Competency Scores than teachers who did not have such training.
3. The correlation coefficient between each of 47 media skills and understandings used to compute the Media Competency Scores and the Total Media Frequency of Use Scores ranged from -.02 to .33.
4. Elementary school teachers of both sexes had significantly higher total Media Frequency of Use Scores

than their sex counterparts in the secondary school. There was no apparent difference in media use between sexes at either the elementary or secondary levels.

5. There was no significant difference in New Media Frequency of Use Scores due to sex or grade level.
6. There was no significant difference in Media Competency Scores, Total Media Frequency of Use Scores, or New Media Frequency of Use Scores due to years of teaching experience.
7. There was no significant difference in Media Competency Scores due to the subject a teacher taught.
8. There were significant differences in both Total Media Frequency of Use Scores and New Media Frequency of Use Scores according to the subject taught.

Conclusions

The first conclusion is an obvious and predictable one: as a teacher's competence in media skills and understandings increases, the frequency with which he uses educational media also increases. This belief is supported by findings of the study indicating a correlation coefficient of .41 between Media Competency Scores and Total Media Frequency of Use Scores.

A second conclusion is that a teacher's competence in some media skills and understandings may be linked to the frequency with which he uses all media. Not all media competencies have this relationship, however. This conclusion is based on findings summarized in Table 1.2, where it is shown that 12 media competencies have correlation coefficients of about .30 with frequency of use scores. Also, 10 of the 47 media competencies tested had correlation coefficients of .10 or less. Kerlinger says that r's of about .30 can lead to important relationships, but r's of .10 or less should be dropped.[1]

A related supposition is that teachers who received college training in the use of media are likely to have more competency in media than those who have not had such training. None the less, the evidence shows that equivalent media competency can be acquired outside of the college classroom. The data reported in Table 1.1 supports this statement. Teachers who had media training in college had significantly higher Media Competency Scores than those without media training in college. More than 16 percent of those without media training in college had higher Media Competency Scores than over one-half of those who did have such training in college. In other words, many teachers acquire media training after graduation--presumably on the job or in in-service courses.

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[1]Kerlinger, op. cit., p. 172.

Contrary to a number of conclusions reported in the "Review of the Literature" neither the grade level taught nor the teacher's sex is an important variable affecting frequency of media use. It is true that elementary teachers had significantly higher Total Media Frequency of Use Scores than secondary school teachers and there was no apparent difference due to sex. But Table 5.1 shows that teachers in certain secondary school subjects have mean scores equal to or higher than the Total Media Frequency of Use Scores of the elementary school teachers. The resulting conclusion is that frequency of media use differences between elementary and secondary school teachers is due to the array of subjects taught in the elementary school and not the grade level taught.

Contrary again to findings presented in some of the literature, it is concluded in this study that years of teaching experience are not a factor in a teacher's competency in media or in his frequency of media use. Tests of pertinent hypotheses clearly demonstrate no significant differences due to years of teaching experience.

The final conclusion is that the subject taught is the most important variable affecting the frequency with which media are used in the classroom. In Table 4.1 it is shown that there is no significant difference in Media Competency Scores due to subject taught. But the findings in Tables 5.1 and 5.2 show there are significant differences in Total Media Frequency of Use Scores and New Media Frequency

of Use Scores due to subject taught. Consequently it is deduced that the subject taught is a more influencial variable than media competency.

The preceding findings thus support the conclusions of Godfrey, "The most important variable related to extent of a teacher's use of audiovisual materials was the subject he taught,"[2] and Knowlton, " . . . the subject a teacher taught turned out to be a better predictor of frequency of usage than attitude."[3]

A summary of the conclusions based on this study can be concisely stated as follows: a teacher's competence in media skills and understandings, and the subject he teaches are the major factors determining the frequency with which he will use educational media in his teaching.

Recommendations for Teacher Education

The recommendations set forth in this paper are based on two assumptions:

1. Because educational media, properly used, play a vital role in the instructional process, instruction in media skills and understandings should be a part of pre-service teacher education.

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[2]Eleanor P. Godfrey, Audiovisual Programs in the Public Schools--1962 Highlights of a National Survey (Bureau of Social Science Research, Inc., Washington, D. C., October, 1963).

[3]Knowlton, op. cit., p. 89.

2. The demands for the undergraduate student's time are so great that pre-service teacher education programs will not be able to require teacher candidates to take a separate audiovisual course.

Pre-Service Teacher Preparation

Two problems for pre-service teacher education can be deduced from the second assumption: (1) the media topics included in the program must be selectively chosen, and (2) the instruction in the chosen content must be incorporated into existing pre-service teacher preparation programs. And it is to the first problem, selection of content, that this study and its recommendations are directed.

Based on the findings of this study and the literature reviewed, it is the writer's opinion that the selected media skills and understandings will fall into three categories. First are those skills and understandings that are obviously necessary to use media in the majority of today's schools. These include the operation of equipment and basic media production techniques. Contemporary opinion among media specialists is that this information and ability can be acquired outside of the classroom via self-instructional systems, and this writer assumes the same position.

The second area involves those media skills and understandings that are unique to a particular subject matter. These specialties have not been identified, and for the present, intuitive judgement will be relied upon to

specify the unique needs for each subject area. As an example, it is apparent that the micro-projector can be identified with the teaching of some sciences. But it is hard to imagine the mathematics teacher needing the operation and production skills and understandings associated with the micro-projector. And it is assumed that, for the most part at least, these unique media competencies can best be taught in the subject matter methods courses.

Finally, as pointed out in the "Need for the Study," ways must be found to motivate teachers to make more use of the audiovisual materials and equipment that are becoming available in the public schools in increasing amounts. It is the recommendation of this paper that pre-service teacher education should concentrate on those media competencies that are most likely to influence a teacher to make effective use of all the instructional resources at his disposal.

Little information is available to specify which media competencies will influence the frequency of media usage, but twelve such possibilities identified in this study are as follows:

1. Construct models and build dioramas, or work with papier maché (one or more)
2. Make and use such chalkboard aids as templates, disclosure devices, and opaque enlargements
3. Design and arrange the learning space to most effectively use audiovisual materials

4. Prepare materials for use with at least one type of "teaching board" (flannel, felt, etc.)
5. Incorporate audiovisual materials as a part of the normal flow of classroom instruction
6. Introduce and follow-up audiovisual presentations
7. Acquire materials from one or more sources of free materials
8. Select audiovisual materials on the basis of principles derived from learning and communication theories
9. Produce programed instruction
10. Explain the various roles media plays in the instructional process (record instruction, extend teacher, enhance learning)
11. Specify the learning task in behavioral terms
12. Evaluate the effectiveness of the use of materials in teaching

Experimental programs should be designed to determine which, if any, of the twelve media competencies really do motivate teachers to make more use of educational media.

The twelve media competencies specified above could easily be incorporated into existing teacher education programs: (1) the most likely place is in the general methods course, (2) in subject matter methods courses, (3) in educational psychology courses, or (4) in self-instructional learning laboratories.

It is the teacher education courses common to all prospective teachers that should be responsible for teaching the media theory, utilization, selection, and evaluation competencies necessary to the "why" of using educational media.

In-Service Teacher Preparation

Media training for the in-service teacher can be accomplished by on-the-job programs, college extension classes or workshops, and on-campus courses. A class of in-service teachers differs from a pre-service class in that the in-service group brings in a wide range of teaching experience and each individual's media competency can range from little or none to very extensive.

To assist in meeting problems of individual differences and to aid instructors who lack media training and/or instructional resources, it is this writer's recommendation that a hard core of media understandings and skills be identified. This core of media competencies would then be divided into modules of knowledge and packaged in self-instructional systems. These packaged modules of knowledge could be put together in various combinations as needed by the instructor.

The recommended hard core of media understandings and skills would be an expanded version of the three categories recommended for pre-service teachers: (1) basic understandings and skills needed to operate equipment and

produce simple audiovisual materials; (2) media competencies unique to a particular subject matter (e.g., Media Competencies for Home Economics Teachers); and (3) the general media theory, utilization, selection, and evaluation skills and understandings that seem to motivate a teacher to use educational media more extensively. And particular emphasis should be given to this third category.

Implications for Further Research

If subject matter taught is an important variable influencing media use and if specific teacher competencies can be linked to frequency of media use, we obviously need to know more about the unique media needs intrinsic to separate subjects, and we also need to know which media competencies are most closely linked to frequency of media use.

The first topic, identifying the unique media needs intrinsic to each separate subject, requires at least two steps: (1) finding out which medium or media are most frequently used by teachers for each subject in the curriculum, and (2) determining the specific nature of the learning tasks to which specific media are applied.

For example, if a person were to investigate media usage among foreign language and mathematics teachers, several predictions could be made. One can hypothesize that foreign language teachers use the tape recorder, language laboratory, slide projector, and motion picture projector,

while mathematics teachers are most likely to use the chalkboard, overhead projector, objects, models, and calculating devices.

Hypothesizing still further, we might predict that foreign language teachers use the tape recorder and language laboratory to present correct pronunciation models which students may emulate and with which they may practice pronunciation and perfect their audio-lingual skills. In addition, foreign language teachers are likely to enrich their teaching with motion pictures, slides, and objects from the native country that illustrate the cultural background of the language being studied.

On the other hand, the mathematics teacher can be expected to use the chalkboard and overhead projector to present symbols and equations that are being discussed. The same two media, however, might also be used to portray pictorial and graphical representations that are useful in guiding the students perception as the teacher introduces new abstract concepts. Geometry teachers, in particular, are likely to use models and objects to provide semi-concrete representations of abstractions being taught. Also, it might be assumed that calculating devices are used to eliminate some of the drudgery and reduce error while teaching concepts that involve some computations.

At present, the above assumptions are the best educated guesses about what and how media might best be used in

teaching foreign language and mathematics. The proposed approach would provide one step towards establishing a firmer base on which to make judgements.

The other suggested research topic, linking a teacher's competency in specific media skills and understandings with frequency of media use, would involve longitudinal studies that follow up experimental teacher preparation programs. Each of several experimental teacher education programs might emphasize instruction in a different set of media competencies. The follow-up studies would compare teachers from the several experimental groups according to their frequency of media use and effectiveness in different subject areas and at several periods of time following exposure to the media instruction received.

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APPENDIX I

BUILDING INVENTORY

INSTRUCTIONAL MEDIA SURVEY

PART ONE - BUILDING INVENTORY

Please give your response by checking the appropriate space or by writing your response on the appropriate line.

1. The name of the school district _____

2. The name of the school building _____

3. How many dollars per pupil are budgeted annually for non-book instructional materials? _____

4. How many of the following are permanently assigned to this building?

Teaching stations	_____	Micro-projectors	
16mm sound projectors	_____	Record players	
8mm projectors	_____	Tape recorders	
Automatic slide projectors	_____	Projector carts	
Filmstrip projectors	_____	Dry mount presses	
Filmstrip viewers	_____	Photo copiers	
Radios	_____	Paper cutters	
Overhead projectors	_____	Primary typewriters	
Opaque projectors	_____	Still picture cameras	
TV receivers	_____		

5. Is the equipment housed in a central place? ___yes ___no

6. Are graphic materials (acetate, marking pens, etc.) available in the building for use by the teachers in their production of transparencies, posters, etc.?

   ____yes ____no

7. Does someone in the building prepare instructional materials for the teachers?

   ____ yes ____ no

8. Does the building have an audiovisual coordinator?

   ____ yes ____ no

   If so, how much time is the person released from teaching? _____

9. Does someone in the building deliver to the room and set up the audiovisual equipment needed by the teacher?

   ____ yes ____ no

10. Does someone in the building operate the more complex equipment for the teachers? ____ yes ____ no

11. Approximately how many hours of planned in-service training in the use of audiovisual materials are provided annually for the teachers in the building? _____

12. Are catalogs of audiovisual materials and equipment readily avilable for use by the teachers? ___yes ___no

13. Do you have

    _____ a centralized instructional materials center?

    _____ a building instructional materials center?

    _____ both a central and a building instructional materials center?

14. Is someone available to help teachers select and acquire audiovisual materials for use in the classroom?

    ____ yes ____ no

    If so, who? _____

15. Does your building subscribe to broadcast television such as IMPATI or Classroom 10? ____ yes ____ no

    If so, is teacher participation optional or required?

    _____

Do you wish to receive a confidential summary of the results from this particular building? ____ yes ____ no

APPENDIX II

INSTRUCTIONAL MEDIA SURVEY

INSTRUCTIONAL MEDIA COMPETENCY PROJECT
INSTRUCTIONAL MEDIA CENTER
MICHIGAN STATE UNIVERSITY

Dear Colleague:

As you know, vast sums of money are being spent by school districts and the federal government for the purchase of audiovisual equipment and materials. At the same time it is apparent that only limited use is being made of this equipment and material by teachers in the classroom.

One reason given for this limited use is that teachers lack the knowledge and skill in the use of audiovisual equipment and materials.

A quick answer type questionnaire is being sent to classroom teachers in selected schools throughout Michigan. It is a part of an effort to identify the knowledge and skills in the use of audiovisual materials that should be included in pre-service and in-service education programs.

The Alpha School System is participating in this study to obtain information that will be useful in evaluating its own audiovisual program.

Will you, as a classroom teacher, help attain the results of this study by marking the appropriate responses, seal the questionnaire in the attached envelope, and deposit it in the box provided in the principal's office.

When you leave the questionnaire please cross out your name on the check off sheet attached to the deposit box. This way all the respondents can be anonymous and we will know when all the questionnaires have been returned.

Thank you for your assistance on this project.

Sincerely,

John Doe
Project Representative
Alpha Public Schools

INSTRUCTIONAL MEDIA SURVEY

PART ONE
BACKGROUND INFORMATION

Please give your response by checking the appropriate space or by writing your response on the appropriate line.

____ Male ____ Female Years of teaching experience_____

Grade now teaching_____ Subject teaching_____

Can your classroom be darkened? ____ Yes ____ No

Does your classroom have a wall socket? ____ Yes ____ No

Does your classroom have a permanent screen for showing projected materials? ____ Yes ____ No

If not, is a portable screen available? ____Yes ____No

What training have you had in either the preparation or use of audiovisual materials such as films, filmstrips, slides, tape recorders, television, etc.?
(Check as many categories as are applicable)

____As a topic or unit in a methods course in college

____College course(s) devoted to audiovisual materials

If more than one, how many courses? _____

____In-service training

____Informal training (self taught)

____No training

In terms of your own experiences, what kinds of conditions or situations have most discouraged you in the use of audiovisual materials? (Name one or two of the most prominent factors.)

PART TWO
KNOWLEDGE AND SKILLS

Listed below are specific items of information and skill involved in the use of audiovisual materials. Will you please indicate by circling the item number of those elements of knowledge or skill which you know or can perform successfully.

KNOWLEDGE AND/OR SKILL TO:

1. Make and use such chalkboard aids as templates, disclosure devices, and opaque enlargements.
2. Do cartooning and simple sketching.
3. Mount graphic and pictorial material using rubber cement or dry mount tissue.
4. Prepare materials for use with at least one type of "teaching board" (flannel, felt, magnetic, or hook and loop).
5. Prepare transparencies (single and overlay) using a marking pencil or felt pen directly on acetate.
6. Prepare transparencies using a heat process (Thermofax) or a diazo (ammonia) process.
7. Prepare tape recordings that require only one voice.
8. Prepare tape recordings that require dubbing from records or other tapes.
9. Prepare photographic slides.
10. Prepare tape-slide instructional presentations.
11. Apply laminating film over mounted or unmounted flat materials.
12. Plan and prepare an instructional T.V. or radio program.
13. Plan and prepare an instructional film.
14. Construct models, or build dioramas, or work with paper maché (one or more).
15. Produce programed instruction materials.
16. Specify the learning task in behavioral terms.

17. Evaluate the effectiveness of the use of materials in teaching.

18. Recall results of research studies which have implication for using audiovisual materials in teaching.

19. Acquire audiovisual materials from sources available in the local school district.

20. Acquire audiovisual materials from sources available in the county or intermediate school district.

21. Acquire audiovisual materials from sources available at the state level (universities, state dept., dept. of health, etc.).

22. Acquire materials from one or more sources of free materials.

23. Select audiovisual materials on the basis of principles derived from learning and communication theories.

24. Recall unique characteristics of various types of audiovisual equipment.

25. Explain the various roles media plays in the instructional process (record instruction, extend the teacher, enhance learning).

26. Design and arrange the learning space to most effectively use audiovisual materials.

27. Incorporate audiovisual materials as a part of the normal flow of classroom instruction.

28. Overcome audiovisual limitations through appropriate methodology and editing or restructuring the materials.

29. Adapt audiovisual techniques to various sized groups of learners.

30. Introduce and follow-up audiovisual presentations.

31. Work effectively with a television teacher's presentation.

32. Prepare learning space under varying conditions for optimum use of projected materials.

33. Perform simple maintenance techniques, such as replacing projection lamps.

34. Store and maintain flat pictures, transparencies, etc.

35. Store and maintain films, filmstrips and tape recordings.

KNOWLEDGE AND SKILL TO SET UP AND OPERATE:

36. 16mm motion picture projector
37. Cartridge loading 8mm projector
38. Filmstrip projector
39. Automatic slide projector
40. Overhead projector
41. Opaque projector
42. Record player
43. Tape recorder
44. T.V. receiver
45. Photocopier
46. Still camera
47. Motion picture camera

PART THREE
USE OF AUDIOVISUAL MATERIALS

On this sheet are listed a few of the better known audiovisual materials. You have probably heard about most of these even if you haven't used some of them.

Beside each of the items listed below is a twenty point scale. Assuming there are 20 teaching days in a month, circle the number on the scale that approximates the number of days per month you use the item in your teaching.

Examples: If you use a radio in your teaching once a month, circle the number 1. If you use it once a week circle 4. If you use an item, but use it less than once a month put an X between 0 and 1.

16mm motion picture.....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
8mm motion pictures.....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Filmstrips.....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Disc recordings (records).....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Tape recorder.....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Radio.....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Television (commercial).....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Television (educational, Cl. Rm. 10, IMPATI).....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Teaching board (flannel, felt, magnetic, etc.).....	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Models and objects.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Maps and globes.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Charts and graphs.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Programed instruction.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Overhead projector.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Opaque projector.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Language laboratory.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Micro-projector.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Chalkboard.....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

OTHER NON-BOOK MATERIALS NOT LISTED

_____	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
_____	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

APPENDIX III

LETTER ASKING SCHOOLS TO PARTICIPATE IN THE STUDY

November 30, 1966

Mr. John Doe, Supervisor
Audio-Visual Department
Alpha Public Schools
Alpha, Michigan

Dear John:

You are very much aware, I know, of the importance of teacher education in the use of media at pre- and in-service levels. We are now in the process of revamping our own media preparation programs here at MSU and are undertaking several studies to provide essential information. I am writing to you to ask your assistance in this effort.

We need essentially two things. One is to have you or the appropriate building principals (or coordinators) fill out an equipment and facilities inventory form; and to have each teacher fill out a media use form. Examples of these are enclosed. Mr. Ed Streeter is conducting the study as a part of his doctoral dissertation and if you agree to participate, he'll be getting in touch with you shortly to work out the details.

Please give me an early call or note indicating your reaction. Should additional or prior clearance from your superintendent or principals be needed, please let me know that also.

Cordially,

Charles F. Schuller, Director
Instructional Media Center

CFS:ck

Enc.

APPENDIX IV

SUMMARY TABLES OF RESULTS OF BUILDING INVENTORY AND INSTRUCTIONAL MEDIA SURVEY PER BUILDING

Table 6.1. Summary of building inventories: elementary schools.

Schools	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of equipment items meeting DAVI standards (basic)	8	9	7	8	9	9	5	3	5	7	6	5	4
Full time district A-V Coordinator	X	X	X	X	X	X	X	X	X	X	X	X	X
Building A-V Coordinator No released time	X	X	X	X									X
Part-time													
Full-time													
Person in the building to help prepare media materials									X				
Equipment can be delivered and set up in the classroom													
Audiovisual person available to help teachers select teaching materials	X	X	X	X	X	X	X	X	X	X	X	X	X
Production materials available		X	X	X	X	X		X	X	X		X	X
Catalogs of audiovisual materials available to teachers	X	X	X	X	X	X	X	X	X	X	X	X	X
Equipment centrally housed	X		X	X	X	X		X	X	X	X	X	X
Building instructional materials center	X	X	X	X	X	X							
Hours of in-service training in A-V (annually)	V	3	0	1	2	2	V	V	V	0	3	5	2
Subscribe to ETV											3		

V = varies.

Table 6.2. Summary of building inventories: secondary schools.

	Schools					
	1	2	3	4	5	6
Number of equipment items meeting DAVI standards (basic)	13	13	11	10	9	9
Full time district A-V coordinator	X	X	X	X	...	...
Building A-V coordinator No released time	...	...	...	...	...	...
Part-time	...	...	...	X	X	...
Full-time	X	X	X	...	...	X
Person in the building to help prepare media materials	X	X	X	...	X	X
Equipment can be delivered and set up in the classroom	X	X	X	X	X	X
Audiovisual person available to help teachers select teaching materials	X	X	X	X	X	X
Production materials available	X	X	X	X	X	X
Catalogs of audiovisual materials available to teachers	X	X	X	X	X	X
Equipment centrally housed	...	X	X	X	X	X
Building instructional materials center	X	X	X	X	X	X
Hours of in-service training in A-V (anhually)	3	V	3	2	0	8
Subscribe to ETV	...	...	X	...	...	...

V = varies.

Table 6.3. A summary of audiovisual equipment items per teaching station or per building in elementary schools.

Equipment	Schools												
	1	2	3	4	5	6	7	8	9	10	11	12	13
16 mm sound projector	1-10	1-12	1-10	1-8	1-8	1-12	1-10	1-10	1-10	1-9	1-10	1-10	1-10
Filmstrip projector	1-4	1-6	1-20	1-2.1	1-2.2	1-4	1-10	1-5	1-5	1-9	1-20	1-6.6	1-7
Overhead projector	1-20	1-24	1-10	1-24	1-16	1-12	1-20	1-20	1-21	1-9	1-20	1-20	1-21
Opaque projector	1-B	1-B	1-B	1-B	1-B	1-B	1-B	1-B	1-B	1-B	2-B	1-B	1-B
Record player	1-3.2	1-4	1-3	1-2.6	1-1.6	1-3	1-10	1-3.3	1-3.3	1-2.1	1-5	1-3.6	1-7
Tape recorder	1-20	1-24	1-20	1-12	1-5.1	1-8	1-20	1-20	1-10	1-4.5	1-10	1-20	1-10
8mm projector	...	...	...	...	...	...	...	...	...	...	...	...	...
Auto-slide projector	...	...	...	...	...	...	...	...	...	...	...	...	...
Filmstrip viewers	...	...	...	...	...	...	...	...	...	...	...	...	...
Radio	1-B	1-B	1-B	1-B	1-B	1-B	...	...	...	...	...	...	...
T.V. receiver	...	1-B	1-B	1-B	...	1-B	...	...	...	...	...	...	...
Microprojector	1-B	...	1-B	...	...	1-B	...	...	...	...	1-B	...	...
Dry mount press	...	...	...	...	...	...	...	...	...	...	...	...	...
Photocopier	...	1-B	...	...	...	...	...	...	...	...	...	...	...
Primary typewriter	1-B	1-B	1-B	...	1-B	1-B	1-B	...	1-B	1-B	1-B	1-B	1-B
Paper cutter	3-B	2-B	2-B	3-B	6-B	3-B	1-B	3-B	5-B	2-B	8-B	4-B	3-B
Still camera	1-B	1-B	...	1-B	...	1-B	...	...	...	...	...	...	...

B = per building.

Table 6.4. A summary of audiovisual equipment items per teaching station or per building in secondary schools.

Equipment	Schools					
	1	2	3	4	5	6
16mm sound projector	1-7.5	1-5.8	1-6.4	1-6	1-7.3	1-5.3
Filmstrip projector	1-7.5	1-4.5	1-5.6	1-10	1-11	1-7.4
Overhead projector	1-7.5	1-10.4	1-7.5	1-6	1-16.5	1-12.3
Opaque projector	4-B	4-B	3-B	3-B	3-B	3-B
Record player	1-7.5	1-5.2	1-9	1-6	1-9.4	1-3.7
Tape recorder	1-11	1-7.4	1-7.5	1-6	1-8.3	1-6.1
8mm projector	1-B	...	...	...	...	...
Auto-slide projector	...	...	...	1-13	1-B	...
Filmstrip viewers	1-9.9	1-4.7	1-11.2	1-5	1-66	1-12.3
Radio	1-B	1-B	...	1-B	1-B	...
T.V. receiver	1-B	1-B	17-B	...	1-B	...
Microprojector	1-B	1-B	1-B	...	...	...
Dry mount press	1-B	1-B	1-B	2-B	...	1-B
Photocopier	2-B	2-B	2-B	1-B	1-B	...
Primary typewriter	1-B	2-B	...	...	...	...
Paper cutter	6-B	2-B	6-B	3-B	6-B	3-B
Still camera	2-B	6-B	...	1-B	4-B	2-B

B = per building.

Table 6.5. Building summary of teacher questionnaire: elementary schools.

	Schools												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Teaching experience													
0-5 years	7	9	2	10	7	3	8	13	12	3	9	12	13
6-10 years	11	8	4	6	5	6	4	2	2	1	1	5	5
11 or more years	3	6	16	3	6	3	9	5	7	5	3	4	4
Unable to darken classroom	9	3	9	5	...	1	...	...	...	...	...	...	...
Permanent projection screen in classroom	3	5	7	4	7	10	5	...	2	...	...	...	...
Portable screen available	8	13	11	6	9	6	21	20	19	7	13	20	22
Highest level of audio visual training													
College course in audiovisual	15	15	9	7	9	7	8	13	5	3	9	15	14
Audiovisual in methods course	1	2	3	4	10	...	4	1	5	1	2	3	4
In-service training	1	1	1	2	...	1	4	2	3	4	2	2	...

Self-instruction	4	5	7	5	...	4	5	3	4	1	...	...	1
No training	1	...	4	1	...	...	...	1	4	...	...	1	4
Deterrents to using educational media													
Physical plant problems	1	1	5	6	...	...	...	...	...	...	...	1	...
Finding time to plan and use	3	3	6	3	...	...	4	2	2	...	...	3	...
Equipment problems	5	4	3	16	9	3	3	8	2	3	3	3	15
Material scheduling problems	5	12	5	6	2	2	4	2	1	2	4	5	4
Lack of suitable materials	2	5	7	1	2	2	1	1	5	...	2	4	...
Other problems	4	2	4	...	1	4	1	5	1	4	4	5	...
Average media competency scores	27.1	27.7	18.6	20.6	26.6	22.8	22.8	26.9	24.6	20.3	27.5	23.8	24.1
Average frequency of media use scores	56.5	64.7	43.8	48.5	55.6	58.4	49.6	56.4	70.0	66.8	58.4	57.7	56.6
Average newer media frequency of use scores	18.9	18.3	9.0	12.5	13.8	16.9	12.7	18.4	17.0	20.8	16.4	14.1	13.6
N =	22	23	24	19	19	12	21	20	21	9	13	21	22

Table 6.6. Building summary of the teacher questionnaire: secondary schools.

	Schools					
	1	2	3	4	5	6
Teaching experience						
0-5 years	29	11	14	11	42	28
6-10 years	22	5	12	5	14	5
11 or more years	24	14	8	..	14	2
Unable to darken classroom	5	1	1	..	41	4
Permanent projection screen in classroom	70	21	18	14	3	1
Portable screen available	..	10	5	2	26	30
Highest level of audio visual training						
College course in audiovisual	30	10	21	6	20	9
Audiovisual in methods course	12	10	6	3	10	7
In-service training	3	2	2	4	7	7
Self-instruction	18	8	2	3	25	10
No training	12	..	3	..	8	2
Deterrents to using educational media						
Physical plant problems	..	4	1	..	21	2
Finding time to plan and use	19	5	2	1	4	3
Equipment problems	7	2	4	1	18	6
Material scheduling problems	13	2	1	..	21	5
Lack of suitable materials	28	17	17	5	12	3
Other problems	12	4	9	7	14	11
Average media competency scores	21.3	18.2	24.2	24.4	19.0	23.8
Average frequency of media use scores	38.2	40.6	41.7	43.2	33.7	48.6
Average newer media frequency of use scores	12.1	11.4	16.0	16.4	7.5	22.3
N =	75	30	34	16	70	35