

A STUDY OF THE FEASIBILITY OF A SYSTEM
OF PRE - SERVICE TEACHER EDUCATION IN MEDIA

Thesis for the Degree of Ed. D.

MICHIGAN STATE UNIVERSITY

MARIE E. McMAHAN

1968



This is to certify that the

thesis entitled

A Study of the Feasibility of a System
of Pre-Service Teacher Education in Media

presented by

Marie E. McMahan

has been accepted towards fulfillment
of the requirements for

Ed. D. degree in Curriculum

Major professor

Date

FEB 10 1971 P67
~~FEB 25 1971~~ 57
— R41
9 — 063
~~OCT 10 1970~~ R6P
Q 1 — 807
DEC 2 1972 K — 337
J — 220
MAR 2 7 1971 43
APR 10 1975 R56
APR 25 1975 72
MAY 12 1975 785
MAY 22 1976 142

~~OCT 18 1978~~ 290
K — 163
42 R 089
N-103
N-124
PICKUP SPR MAY
SPR JUN
C — ~~SUM 1982~~ 272
Q-275
JUL 16 '86

ABSTRACT

A STUDY OF THE FEASIBILITY OF A SYSTEM OF PRE-SERVICE TEACHER EDUCATION IN MEDIA

By

Marie E. McMahan

This study investigated the feasibility of designing a system for developing media selection and utilization competencies in existing education and methods courses by: (1) identifying nine desirable competencies for initial development at the pre-service level, (2) procuring the judgments of representative elementary education professors at Michigan State University regarding optimum points in the elementary course sequence for initial development of each competency, (3) deriving system design procedures from the literature, and (4) testing on a pilot basis in one course the system procedures for developing media selection and utilization competencies.

Summary and Conclusions

The conclusions are:

1. That findings of student and faculty surveys to ascertain the degree of media competency development of prospective elementary teachers

at Michigan State University demonstrate a substantial need for improving current methods of developing these competencies.

2. That the substantial agreement of professors interviewed regarding appropriate points in the elementary education sequence for introduction of specified media competencies indicates the desirability and feasibility of a systematic approach to media competency development.
3. That professors' recommendations regarding points at which specific media competencies should be introduced suggest a logical sequence of competency development in existing elementary education and methods courses.
4. That steps for system design derived from the literature and applied to planning for competency development in one course are practical and helpful.
5. That, following use of such procedures, students reported significantly more media experiences than they had at the beginning of the course.
6. That members of the post-student teaching group reported more media experiences at the beginning of the course and greater growth in media experiences during the course than those who had not participated in student teaching.

7. That students using self-instructional programs on media selection and utilization were able to suggest applications in other situations of the principles developed in the programs.
8. That the system, as initially tested, should be redesigned to place greater emphasis on psychological organization.

Recommendations

The recommendations of this study are based on three assumptions: (1) that prospective teachers need to acquire certain basic media competencies, (2) that a media course is not the complete answer for the development of these competencies, and (3) that alternative answers to the problem need to be tried.

As a result of the findings of this study and the review of pertinent literature, the following recommendations are made:

1. That media professionals and teacher education faculties collaborate in identifying media competencies and attitudes which they want prospective teachers to acquire.
2. That a systematic approach to development of these competencies within existing education and methods courses be planned.

3. That such an approach take into consideration the background and needs of individual prospective teachers and relate media competency development to purposes which are important to faculty and to students.
4. That such an approach identify and take advantage of the instructional roles which can best be played by faculty members and by multi-media self-instructional programs.
5. That planners consider the following steps in developing the proposed system of teacher education in media:
 - a. Goal identification (i.e., deriving system objectives from the identified media competencies).
 - b. System analysis (i.e., specifying functions to be performed by the proposed system).
 - c. System synthesis (i.e., incorporating these functions into a system model).
 - d. System try-out and evaluation (i.e., testing the proposed model).
 - e. System redesign (i.e., redesigning the model as necessary for more adequate goal achievement).

6. That, in order to facilitate acceptance of the system, planners take the following into account:
 - a. The kind of climate that encourages change.
 - b. The role of administrators, innovative staff members, and "respected others" in change.
 - c. The role of adequate support staff, materials, and facilities in change.
7. That system planners evaluate the system by determining whether it does the following:
 - a. Achieves identified goals.
 - b. Adapts to needs of students with varying backgrounds, attitudes, and perceptions in relation to media.
 - c. Allows both teachers and students to function in a creative manner.
 - d. Utilizes the unique capabilities of both teachers and media.
 - e. Facilitates better communication and cooperation among its components.
 - f. Facilitates analysis of when and how it (i.e., the system) needs to change.

A STUDY OF THE FEASIBILITY OF A SYSTEM OF
PRE-SERVICE TEACHER EDUCATION IN MEDIA

By

Marie E. McMahan

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF EDUCATION

College of Education

1968

ACKNOWLEDGMENTS

The development of a dissertation is a long and arduous process, and the completed product includes the contributions of a number of people. Although it is impossible to recognize all of those who have participated in this study, the author wishes especially to acknowledge her indebtedness and express her gratitude to the following:

To Dr. Charles Schuller, chairman of the advisory committee for his wholehearted support and encouragement throughout the doctoral experience and especially for the quality of his guidance (and the graciousness with which it was given) in the writing of the dissertation; to members of the committee, Dr. Charles Blackman, Dr. Jean LePere, and Dr. Donald Olmsted and also to Dr. Paul Witt of the Instructional Media Center for the gift of valuable time and for many worthwhile contributions to the author's thinking; to the professors and students who participated in the surveys; and especially to the author's parents and sister, Edna, for their strong support throughout the doctoral program and for their confidence that the goal would be reached.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
Chapter	
I. THE PROBLEM	1
Need for the Study.	1
Purpose of the Study	6
Plan of the Study	7
Definition of Terms	10
Organization of the Study	10
Summary	11
II. REVIEW OF THE LITERATURE.	13
Media Competencies.	13
Development of Media Competencies.	17
The Systems Approach to Instructional Planning	23
Teacher Education	32
The Change Process.	33
Summary	35
III. DESIRABLE MEDIA COMPETENCIES AND THEIR ACHIEVEMENT IN PRE-SERVICE TEACHER EDUCATION.	37
Summary	46
IV. DEVELOPMENT OF A SYSTEM OF TEACHER EDUCATION IN MEDIA.	47
Goal Identification	47
System Analysis.	61
System Synthesis	68
Try-Out and Evaluation	81
System Revision.	102

Chapter	Page
V. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY OF THE INSTRUCTIONAL SYSTEMS APPROACH TO DEVELOPMENT OF MEDIA COMPETENCIES	110
Implications of This Study	119
Educational Change	127
Proposed System Development Procedures.	132
Summary and Conclusions	141
Recommendations	144
APPENDICES	148
APPENDIX A	149
APPENDIX B	156
APPENDIX C	160
APPENDIX D	163
BIBLIOGRAPHY	176

LIST OF TABLES

Table	Page
1. Proposed System Development Procedures . .	30

LIST OF FIGURES

Figure	Page
1. Summary of Judgments of Seven Representative Elementary Education Professors at Michigan State University Regarding Placement of Media Competencies in Existing Education and Methods Courses. .	44
2. Media Experiences Reported by at Least Half of 35 Students (Pre-Student Teaching Level) Enrolled in Two Children's Literature Classes at Michigan State University at Beginning of Spring Term, 1968.	54
3. Degree to Which Representative Elementary Education Professors at Michigan State University Perceive Media Competencies to Have Been Developed When Students Enter Their Classes	56
4. Media Experiences Reported by at Least Half of 37 Students (Post-Student Teaching Level) Enrolled in Two Children's Literature Classes at Michigan State University at Beginning of Spring Term, 1968.	58
5. Model of System of Teacher Education in Media.	69
6. Implementation of System of Teacher Education in Media	73
7. Portion of System Tested in Children's Literature Classes	86
8. Reason for Selection of Strategies	89
9. Media Experiences Reported by at Least Half of the Students Enrolled in Two Children's Literature Classes at Michigan State University at Beginning and End of Spring Term, 1968.	96

Figure	Page
10. Students' Evaluation of the Self- Instructional Programs on Types of Media	101
11. Redesigned Model of System of Teacher Education in Media.	103
12. Proposed Procedures for Investigation of a System of Teacher Education in Media. .	142

CHAPTER I

THE PROBLEM

Need for the Study

Teaching is more challenging in 1968 than ever before. The essence of this challenge was ably captured by Harold Shane (1967), Professor of Education at Indiana University, in Phi Delta Kappan when he said:

We have encountered the future so rapidly and with such violent changes in the ordered and familiar patterns of our way of life that we are suffering '. . . the dizzying disorientation' brought on by the premature arrival of the future. Many generations of change have been compressed into the span of 10 years (p. 67).

Among the "jolting educational changes" described by Shane are ones with which we are all familiar: proliferation of knowledge; an unprecedented population explosion; rapid development of cybernetics; organization of instructional combines; and deterioration of core areas of cities with resultant inequity of educational opportunity for pupils in inner city and suburban schools.

Goodlad (1968), surveying the milieu in which schools currently exist, stated baldly:

. . . One is led to conclude that today's schools are obsolescent. They were designed for a different culture, a different concept of learners and learning, and a different clientele. The central problem, it seems to me, is that the intensity of the school must be enormously increased (p. 6).

It seems clear that schools will have to change. Tomorrow's teacher will need to face multiple and diverse challenges with new approaches, new materials, new competencies. Fortunately, there are supporting elements. The technological revolution of the twentieth century has generated many new teaching tools, and federal legislation, such as the National Defense Education Act and the Elementary and Secondary Education Act, has permitted schools to purchase substantial quantities of the new equipment and instructional materials.

But tools and materials without expertise in their use are inadequate to the task. As was so well demonstrated in Wittich's (1946) classic utilization study, cognitive learning increments from materials such as films can be doubled if careful preparation and follow-up are integral parts of a lesson.

Research in the audiovisual area has long shown that when educational media are appropriately used they can enhance and improve learning. Early studies such as that by Arnspiger (1933), for example, ably demonstrated that single media types (e.g., films) had the capability of greatly extending both cognitive learning and retention. What is more important in a period characterized by availability

of many diverse types of media, subsequent research (Allen, 1952) revealed that additional learning accrued from use of appropriate combinations of media in a teaching-learning situation.

Pre-service experience in the selection and use of new media, materials, and methods appear to be of significant help to teachers when they get on the job. Oliver (1962), for example, found that more and better media use prevailed when teachers had experienced pre-service training in this area. A study by Streeter (1967) confirmed Oliver's findings, revealing that those teachers having pre-service experiences with media had initial competence in this area and that they tended to use more media.

In addition, growing concern on the part of both media professionals and public school administrators that teachers become increasingly competent in media use is producing numerous requests for more pre-service education in this area. As long ago as 1959, Dr. Anna Hyer (1959), Executive Secretary of the Department of Audio-visual Instruction of the National Education Association, said: "Concentrated attention to improved methods of developing AV competencies in the teacher education program is long overdue" (p. 40). More recently, Georgia supervisors have strongly urged training in media selection and utilization for prospective teachers prior to student teaching (Oliver, 1962), and administrators

of schools for the deaf have suggested that "teacher training institutions up-date curriculum to give information and training in use of the latest technological devices" (Stepp, 1965).

If prospective teachers need opportunities to develop competencies in use of instructional materials, the question follows as to whether the majority of them have such opportunities at the undergraduate level. Various surveys suggest that they do not. One by the National Council for Accreditation of Teacher Education, for example, reported that only 26 per cent of the institutions affiliated with it required audio-visual instruction (Torkelson, 1966). Another, by the Research Division of the National Education Association, revealed that 60 per cent of the in-service teacher respondents were dissatisfied with their undergraduate media training (Wittich and Schuller, 1967). It appears, therefore, that alternative solutions to the provision of undergraduate media experiences need to be sought.

In the summary report (Allen, 1960) of the 1958 Lake Okoboji Audio-Visual Leadership Conference which dealt with pre-service teacher education in development of media competencies reference is made to this problem. The report proposes that development of competencies "can theoretically best be accomplished through a completely integrated media program in all

professional coursea and particularly in methods courses" (p. 31). This statement leads to the inference that development of media competencies in existing education and methods courses might be a reasonable alternative to separate media courses. Since total integration of methods and media involves multiple interrelationships such as those among staff members, students, teaching-learning objectives and available materials and equipment, a procedure which would enable a staff to consider these interrelationships is necessary.

One method which educators have begun to look to in consideration of complex instructional problems is the systems approach. Initially utilized by industry and the armed services, the systems approach with respect to instruction was first discussed by Hoban (1956) in his keynote address at the National Audiovisual Leadership Conference at Lake Okoboji in 1956 and later by Finn (1956) in the publication Teaching Tools and by Carpenter (1960) at a symposium on the state of research in instructional television.

A four-year study of the potential of a systems approach in higher education instruction was undertaken at Michigan State University in 1963. During the first two years of the study an instructional systems model was designed and tested in two university courses at Michigan State University (Barson, 1965). During the third and fourth years, the model was further tested at Syracuse University, San Francisco State College, the

University of Colorado, and Michigan State University (Barson, 1967).

Trzebiatowski (1967) undertook to analyze the systems approach to instructional development in order to assess its potential in higher education. After detailed examination of the literature on systems and careful analysis of the model developed by Michigan State University, he concluded that the instructional systems approach appears to have great potential as an instructional planning technique.

Assuming the need for media competence on the part of teachers and in lieu of a separate course, alternative approaches to development of media competencies--such as the use of a systems approach in existing education and methods courses--must be tried.

Purpose of the Study

The purpose of this study was to investigate the feasibility of a system of teacher education in media designed to function within the present teacher education system of Michigan State University to develop, as an integral part of existing elementary undergraduate education and methods courses, desired competencies in selection, production, and utilization of media.

More specifically, this study undertook to answer the following questions:

1. What competencies in selection, production, and utilization of media should be initially developed at pre-service level?
2. What do selected professors of undergraduate elementary education and methods courses at Michigan State University consider to be the optimum point or points in the elementary course sequence for initial development of each of the suggested media competencies?
3. Do the recommended competencies tend to fall in such a way as to suggest a logical sequence within existing education and methods courses?
4. To what degree do the selected professors perceive the identified media competencies as being currently developed by prospective elementary teachers at Michigan State University?
5. Can suggested steps for system development, as derived from the literature, be used to identify a procedure for the design and operation of a system of teacher education in media?
6. If a pilot study is conducted with one course, what implications are there for redesign of the total system?

Plan of the Study

This was a pilot study designed for the purpose of considering the feasibility of a systems approach to

development of media competencies by prospective elementary teachers at Michigan State University. A list of desirable media competencies was compiled and an analysis made of the degree to which they are currently being developed. Next, steps for development of an instructional system were derived from the literature, applied to the problem of the proposed development of media competencies in existing elementary education and methods courses, and tested in a pilot study in one methods course. Specific steps included identification of:

1. Media Competencies to be Sought.--A list of media competencies was derived from the literature and validated for purposes of this study by two media and teacher education specialists at Michigan State University.

2. Current Status of Development of Identified Media Competencies.--Professors with experience in use of media were interviewed to determine their perceptions of the degree to which the identified media competencies are currently being developed in the elementary education program at Michigan State University. Seven professors were interviewed, including one from each of the following courses: Individual and the School, Curriculum Methods and Materials, and methods courses in the teaching of mathematics, reading, science, and social studies. A representative of the student teaching program was also interviewed.

3. Sequence of Media Competencies.--The previously-identified professors were then asked to indicate what they considered to be the optimum point in the elementary course sequence for initial development of each of the identified media competencies. These recommendations were then used to set up a sequence of such competencies in specific undergraduate education and methods courses.

4. System of Teacher Education in Media.--Appropriate steps in instructional system development were identified from the literature. These steps were then used as a guide in designing, operating, and evaluating a system of pre-service teacher education in media. The sequence derived in the previous step was used to determine in which courses specific media competencies should be developed.

5. Pilot Study.--One course, Education 325C, Children's Literature, under the direction of Dr. Jean LePere, was used to test operation of the proposed system. The steps identified for design and operation of the total system were utilized in designing and providing media experiences for the course. Findings of the pilot study were analyzed and suggestions made for redesign of the system. Of particular importance in this analysis were efforts to determine whether the system could facilitate development of the desired media competencies in a manner consistent with the basic human values so important in teacher education.

Definition of Terms

Media.--The terms media, educational media, instructional media, audiovisual media, and instructional materials are used interchangeably in this study to refer to the complete range of non-print materials available for utilization by teachers for instructional purposes or by students for learning or presentation purposes. (See Continuum of Audiovisual Media in appendix.)

Media Competencies.--Competencies, as used in this study, refer to a composite of understandings, abilities, and skills sufficient to a teacher's needs in the type of teaching-learning situation being described (e.g., Competency in selection of media would refer to a composite of understandings, abilities, and skills which would enable a teacher to select appropriate media types for a specific instructional purpose).

Instructional System.--An instructional system consists of learners, teachers, media professionals, materials, and machines whose relationships are carefully defined in order to enable them to start with specified inputs, work cooperatively in a manner designed to achieve agreed-on outputs, and adjust, as necessary to insure more adequate achievement of the desired outputs.

Organization of the Study

Consideration of the feasibility of development of a system of teacher education in media begins with

statements of: the need for the study, the purpose of the study, major questions to be considered, and a definition of terms to be utilized in the study.

Chapter II reviews the literature on media competencies, procedures for developing such competencies at the pre-service level, proposed steps in designing instructional systems for higher education, and procedures for facilitating change. Chapter III identifies the media competencies proposed for development at pre-service level and the points in the elementary program at which selected professors believe each competency should be introduced. It further attempts to set up a continuum for the sequential development of media competencies as an integral part of specific undergraduate education and methods courses. Chapter IV explores the feasibility of a system of teacher education in media by suggesting steps for design, operation, and evaluation of such a system and by conducting a pilot study in one course to test the proposed steps. In Chapter V the study is summarized and conclusions drawn regarding the feasibility of designing and operating a system of teacher education in media in conjunction with education and methods courses.

Summary

There is currently much concern among educators that the multiple and diverse challenges faced by

education are not being adequately met. Sensing the crucial need for teachers to develop increased competence in the utilization of a wide range of instructional techniques and materials, they are urging teacher education institutions to place more emphasis on development of the desired media competencies by prospective teachers. Universities are currently unable to provide basic media courses for the rapidly-increasing numbers of prospective teachers on their campuses, making it necessary for them to seek other solutions to the problem of developing the necessary media competencies. Since recent research has indicated the usefulness of the systems approach in the solution of instructional problems at the higher education level, this study proposes to explore the feasibility of use of this method in designing a program for development of media competencies in existing education and methods courses.

CHAPTER II

REVIEW OF THE LITERATURE

Media Competencies

A review of the literature on recommended media competencies reveals that they have not been static. Rather they have changed with shifts in instructional methods, available technological devices, and the degree of sophistication of media professionals.

A substantial increase in use of audiovisual materials after World War II focused attention on teachers' need to acquire media competencies. As a result a number of surveys were made to ascertain what general and specific competencies media specialists felt teachers should develop.

The Pascoe study, conducted in California in 1957, made an important contribution in establishing the priority of competencies in the areas of selection and utilization of media (Pascoe Report, 1959). Of eight competencies rated by instructors of audiovisual courses and directors of audiovisual programs, utilization and selection of media were identified as most crucial.

In an article entitled "What Constitutes Teacher Competence in Audiovisual Communication?", published in Phi Delta Kappan, Fulton and White (1959) reported general consensus that selection and utilization competencies could be subsumed under four headings: (a) selection and evaluation of material; (b) utilization of appropriate instructional material; (c) production of simple instructional material; and (d) preparation and use of physical facilities.

Later competency lists began to establish the relationship of media to the total instructional program. Participants at the 1958 Lake Okoboji Audiovisual Leadership Conference, for example, recommended that teachers should have a working point of view based on certain "philosophical and psychological factors underlying use of audiovisual materials in the teaching-learning process" (Allen, 1960, p. 29). Singled out for special emphasis were such factors as:

1. Knowledge and understanding that the accepted principles of use of audiovisual materials are based on sound research.
2. Communications theory and learning theory underlying the use of audiovisual materials and equipment in the classroom.
3. Understanding of the relationship of audiovisual materials to the curriculum (p. 29).

By the early 1960's increased emphasis on instructional systems and the role of media in such systems made further updating of competency lists necessary.

Meierhenry (1966) undertook this task in 1965, and a year later, with the assistance of six nationally-known audiovisual leaders, he made available a new and comprehensive volume on Media Competencies for Teachers.

Topics discussed in the Meierhenry publication included: instructional systems (Heinich); theory (Norberg); media selection (Gerlach); equipment operation (Curl); production (Kemp); and utilization (Torkelson). Each author, considering the systems approach and other recent influences in education, attempted to extrapolate future trends in teacher education, including those related to media. Many potentially useful procedures were identified and discussed.

In summarizing the six papers and attempting to prepare an instrument against which teacher education institutions could measure their current programs for development of media competencies, Meierhenry identified several basic experiences which he suggested prospective teachers should have. Those related to selection, utilization, and production of media are pertinent to this study and are listed below:

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.

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 judgments as to which medium used alone or in combination with other media will most effectively and efficiently produce the 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 programmed instruction or learning laboratories might be more suitable for certain content areas.

V. Actual experience 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 (pp. 225-226).

Production of Audiovisual Materials

I. Manipulative Skills

- A. Using the chalkboard
- B. Cartooning and simple sketching
- C. Mounting pictorial materials
- D. Lettering
- E. Making displays
- F. Duplicating printed materials
- G. Recording on tape
- H. Making transparencies (p. 229).

In presenting his suggested list of competencies, Meierhenry (1966) recognized that such lists cannot be static. He said: "One of the difficulties with developing specific competencies is the rapidity with which they become out-of-date and obsolescent" (p. 224). His inference

was that teacher education institutions concerned with competency development might start with such a list as his and adapt it in terms of new educational influences and of their own requirements.

Development of Media Competencies

Although identification of adequate methods of developing media competencies is as important as selecting those to be developed, the literature indicates only a limited amount of attention to this problem.

A Formal Media Course

During the 1930's and 1940's a few media enthusiasts began to recognize the need for teacher education and to advocate a required audiovisual course. Accordingly, two states (i.e., Pennsylvania in 1934 and California in 1946) passed rulings making such a course mandatory for those seeking permanent teaching certificates. By 1957, approximately 15 per cent of the teacher education institutions affiliated with the American Association for Colleges of Teacher Education required an audiovisual course of prospective elementary teachers and about 12 per cent required one of prospective secondary teachers.

Fulton (1960), writing on teacher preparation in the Journal of Teacher Education, declared that a required media course was not the complete answer to competency development. He cited extreme scheduling

difficulties and inability to provide adequate laboratory facilities as disadvantages of this method.

In considering advantages and limitations of the formal course, participants at the 1958 Lake Okoboji Conference (Allen, 1960) discussed such advantages as: (1) more organized presentation of audiovisual content, (2) more adequate instruction and facilities, (3) more adequate time, (4) more depth of experience for students, (5) more opportunities to influence attitudes toward media, (6) and more chances for recruitment of media specialists. They also discussed such limitations as: (1) inability to reach many of the students, (2) difficulty of adapting course to wide range of needs, and (3) difficulty of presenting content in terms of learning problems.

Although little attention has been focused on alternative methods of competency development, a review of the literature reveals some discussion of the advantages and disadvantages of the following: integration with methods, the laboratory approach, and the self-study approach.

Integration with Methods

Participants at the 1958 Lake Okoboji Conference (Allen, 1960) decided that, theoretically, competency development could best be achieved through a completely integrated program in education and methods courses. In

evaluating this approach, they discussed the following advantages: (1) media training offered to all students, (2) student interests and needs considered, (3) in-service provided for all education instructors, (4) longer contact with AV made possible, (5) limitations of separate course structure overcome, (6) audiovisual concepts presented in larger and more realistic frame of reference.

Looking realistically at the usefulness of the completely integrated program, however, Okoboji conferees indicated that its success would be contingent on: (1) procuring the effective participation of all methods course instructors, (2) having a method of evaluating the student to determine his full scale accomplishment of the needed audiovisual competencies, (3) having all students involved in the integrated program, and (4) providing ample opportunity for laboratory experience as needed.

The Laboratory Approach

Various educators have suggested the laboratory approach as an alternative method of media competency development. Meierhenry (1966) and Combs (1965), for example, have both advocated this method, and, although their approaches differ, they are not incompatible. Meierhenry conceives of the laboratory as a place to which prospective teachers will go to gain much of the

substantive content of the teaching field. Learning independently from types of instructional materials which they will later use with their own students (e.g., television, 8 mm films, transparencies, and programmed instruction), they will, he believes, develop many of the media competencies needed by teachers.

Combs perceives the laboratory as a place in which prospective teachers can encounter an abundance of materials and equipment and can explore a variety of instructional techniques. Staffed by a person who has been an excellent teacher, who is sensitive to student needs, and who is willing to share himself and his skills, the laboratory makes possible the discovery and critical appraisal of many methods of using materials.

These concepts of a teacher education laboratory suggest an area in which students can work independently or in small groups, having access to materials both programmed and unprogrammed, having space in which to experiment, and having professional assistance when needed.

The Self-Instructional Approach

This approach, although it might occur in a laboratory, differs from the two just described in that it involves self-instructional programs on the substantive content of the media field. It was one of four methods investigated by Torkelson (1965) in an effort to establish

empirical evidence of the superiority of one method of media competency development over others.

Torkelson's study covered a four-year period and compared the following methods: separate course, integration, student teaching, and self-study. During the first two years approximately 1,000 prospective teachers were instructed by one of the four methods and then tested; during the last two years, two hundred of them were visited in their own classrooms. Classroom visits were analyzed by means of the following instruments: school description, classroom description, class visitation check list, open-end interview, course opinionnaire, course effectiveness inventory, and frequency of use inventory. Although all patterns resulted in significant mean gains from pre- to post-tests, Torkelson found none to be superior to all others on all measures.

There were, however, some interesting findings with regard to self-instruction. Following Phase One of the study, Torkelson concluded:

In terms of the teaching of equipment operation, the self-study pattern proved that this kind of perceptual motor skill can be learned through the avenue of specially prepared materials without the presence of an instructor (p. 149).

If information acquisition includes a conceptualization of the interrelationships of audiovisual type materials with the teaching-learning process, self-instructional materials may have limited application (p. 71).

Following Phase Two of the study, Torkelson further stated:

It appears significant that the teachers who had been prepared in the self-study pattern had the highest opinionnaire, classroom description, and class visitation scores. These scores reflected greater use and a more positive attitude than for the teachers who had been prepared through the other patterns (p. 152).

The evidence from this experiment seems to suggest that the process of self-discovery and personal involvement in determining the merits of audiovisual materials in teaching and learning may develop the attitudes which will result in greater utilization on the teaching job (p. 152).

In considering both the advantages and limitations of self-instructional materials as revealed by his study, Torkelson concluded: "Perhaps more self direction and more depth in the actual utilization of audiovisual materials in all of the courses in teacher preparation may be the answer" (pp. 151-152).

The literature on media competency development suggests that each discrete method has both advantages and limitations. This does not, however, preclude the necessity of finding an adequate solution to the problem. Fulton (1960), in the previously-cited article in the Journal of Teacher Education, proposed, after careful analysis of the existing situation, that teacher education institutions should "embark on an intensive program designed to develop audio-visual competence" (p. 494). Like Torkelson, he suggested that such a program employ some combination of the previously-discussed methods.

Meierhenry, discussing the problem in the summary chapter of his recent publication on competencies, concurred with Fulton's point of view but added an emphatic admonition that:

. . . more careful and systematic planning will need to be carried out in regard to the entire teacher education program than was done previously, and the media competencies must now be deliberately planned with purposes and functions to be met rather than developed haphazardly, incidentally, or not at all. All persons responsible for the education of teachers, including those who teach foundation courses, child growth and learning courses, and the methods courses along with the academic areas, must provide for learning experiences involving media in order that the prospective teachers may experience firsthand the contributions of such learning resources (p. 219).

The Systems Approach to Instructional Planning

A media program of the scope and complexity proposed by Meierhenry would require the most sophisticated of planning techniques. Increasingly in recent years, audiovisual leaders such as Finn (1956), Hoban (1956), and Carpenter (1960) have theorized that the systems approach is an appropriate method of dealing with such complex situations. The conclusion of Trzebiatowski (1967) following his comprehensive study of the potential of the systems approach in higher education supports this point of view.

To evaluate the potential usefulness of the systems approach in the present situation, it is necessary to understand to what degree system capabilities match the

situation requirements. The literature provides a number of clues to the capabilities of systems.

To begin with, system definitions furnish such clues. According to Trzebiatowski (1967), general system theory describes a system as any grouping of components which operates in concert or related fashion with the purpose of accomplishing a specific goal or set of goals. System components are dynamically interrelated, such a relationship implying that they are capable not only of changing the performance of the system as a whole, but of affecting one or more of the other components.

This description suggests that one of the capabilities of a system is that of changing to meet altered conditions. Diamond (1965) confirms and emphasizes this capability when he says:

The systems approach to instruction not only allows for change but demands it. . . . By requiring stated objectives (the prerequisites of evaluation) and a continual evaluation of the program and materials being used, this technique, more than any other, is a tool for change and a lever for improvement of instruction (p. 370).

Tracing the history of the systems approach provides added clues to system capabilities. Trzebiatowski (1967) suggests that system methodology resulted from the convergent development of system engineering, information theory, system analysis, and operations research. Each of these resulted from a specific need, and, accordingly, was able to make a specific contribution to the systems

approach. Operations research, for example, came into existence to solve certain strategic and logistics problems during World War II and contributed to the systems approach a scientific method of studying the immediate future. System analysis grew out of a need for design and analysis of data systems and, as a result, furnished methods of identifying communication networks in systems. System engineering developed as a result of need for control of electromechanical devices and, consequently, provided procedures for organizing man-machine combinations.

Derivation of the systems approach from these disciplines suggests its possible usefulness in the following kinds of situations: those concerned with problems too urgent for solution by the typical slow research to practice procedures often found in education, those involving communication problems resulting from complex interrelationships, and those involving new elements requiring man-machine relationships. A review of the literature on systems confirms the fact that they do, indeed, have these capabilities.

They do, for example, provide a scientific and speedier approach to problem solving. Hopkins (1960), in a precise comparison of the steps used in the scientific method with those used in the systems approach, found them remarkably similar. Of interest to this study, however,

is the fact that, while the major purpose of the scientific method is to contribute to theory (and eventually to practice), Finan (1962) posits that the purpose of the systems approach is to facilitate problem solving and decision making in the here and now.

That a system can deal with the communication problems resulting from complex interrelationships is inferred by Silvern (1965) when he describes a system as "the structure or organization of an orderly whole, clearly showing the interrelationship of the parts to each other and to the whole itself" (p. 367). After a long period of study of systems, Silvern believes the characteristic that differentiates this approach from others is its ability to deal with interrelationships. It follows that correct analysis of interrelationships contributes to better communication among system components.

Probably one of the most important system capabilities as revealed by the literature is that of providing a way of conceptualizing optimum man-machine relationships in instruction. Hoban (1962) proposes that "the problem of management of learning becomes more acute when any aspect of new technology is introduced into education" (p. 5), and it is obvious that the availability of many sophisticated new teaching tools necessitates kinds of instructional decisions never before

required. Discussing this matter in a recent issue of AV Communication Review, Carpenter (1968) said:

The major problems, it seems to me, are decisions about what roles and functions can be served or mediated by people, by instrumentation, by conditions, by the internal controls and self-activated regulated contingent efforts of the individual learner himself. I think that the controversies about the roles and development of instrumentation or the roles and development of people are beside the point. Both are required. It is rather a question of what specific roles can be most appropriately carried out by which people or what things or what instrumentation (p. 21).

One of the most crucial questions in education today is that of appropriate teacher roles. Trow (1963), in his book, Teacher and Technology, somewhat facetiously suggests that today's teacher is a custodian, clerk, foster-parent, disciplinarian, examiner, audio-visualist and technician, librarian, student adviser, therapist, recreation leader, and responsible citizen. Obviously, a number of these roles are inappropriate. Limiting himself to purely instructional roles, however, a reviewer of the literature still finds much concern regarding the inappropriateness of certain of these roles.

Addressing himself to the question of teacher roles, Witt (1968) recently interjected a hopeful note into the discussion when he told a group of curriculum specialists, librarians, and media professionals that technological devices will play an important part in freeing the teacher from inappropriate roles and enabling him to make use of his unique humanness. He said:

Through the intelligent and effective use of instructional technology it will be possible to free teachers to devote their time and talents to those tasks which only they can do and which they must do if their pupils are to develop to their full capacity (p. 15).

Thus the systems approach may not only strengthen instruction but free the teacher to act in a more human capacity. First, however, it must help in ascertaining what that more "human" role is. Carpenter (1960) suggested that systems can, in fact help to differentiate between roles to be played by men and machines. He said:

The means of executing these functions are specified, and components of the system are defined to include human capabilities, machines, materials and their interaction in the system. Distinctions are made between those functions which can best be performed by persons with known competencies and those which can best be performed by instrumentation and materials with known characteristics (p. 75).

The literature suggests, then, that systems have several unique capabilities: (1) that of facilitating change in instruction, (2) that of helping planners conceptualize the interrelationships and optimum roles of system components (including men and machines), and (3) that of providing scientific procedures for making instructional decisions in the immediate future.

As a result of recent attention (both theoretical and empirical) to system development procedures, the literature also provides assistance in the design of instructional systems. Consideration of system development procedures advocated by Schuller (1968), Carpenter

(1962), Hopkins (1960), and Trzebiatowski (1967) leads to discovery of many common elements in current plans for system design. (See proposed procedures in Table 1.)

These appear to be:

1. Goal definition. This presupposes attention to the present system, its components, its input (including knowledge, competencies, and attitudes of students), and its inadequacies as presently organized.
2. Analysis. Once goals have been determined, analysis of required system functions can occur. This is followed by division of the system into sub-systems, based either on the functions to be performed or, as suggested by Trzebiatowski (1967), on "common inputs and outputs, geographical characteristics, the use of common processes or techniques, and so forth" (p. 118). In determining optimum procedures, alternate possibilities need to be considered, trade-off analyses being used to facilitate decision-making.
3. Synthesis. Following their identification, sub-systems need to be incorporated into a proposed system model. If they have been determined on the basis of functions, consideration of appropriate means of executing these functions needs to

TABLE 1.--Proposed system development procedures.

Schuller	Carpenter	Hopkins	Trzebiatowski
Description of present system		Gather facts on which to base system objectives	
Analysis of specific problem			
Specification of objectives	Goals defined	Formulate objectives from the facts	Determination of functional objectives
Examination and choice among alternative solutions (trade-off analyses)	Sub-systems of functions	Analyze, quantify, and organize, and relate requirements to the state of the art techniques	Definition of system: inputs and outputs Analysis of requirements Division into sub-systems
Selection of instructional strategies and media	Means of executing functions Differentiation of man-machine functions Events sequenced and scheduled	Formulate, design, and construct model to produce required system behavior Establish criteria for testing model	Synthesis
Selection/production of media and materials			
Try-out and evaluation	System tested	Operate model and measure results	Modeling and simulation
Revision and field testing	System re-ordered	Adapt or reject modeled design	Field testing and re-design

occur. Determination must be made of those functions to be accomplished by people alone, by media alone, and by combinations of people and media. This suggests selection of appropriate strategies, followed by identification or production of media.

4. Try-out and evaluation. An important step in system development, this can be achieved either through computer simulation or actual try-out in a limited situation.
5. Revision and field testing. Redesign of the system on the basis of its ability to achieve its identified goals is a basic concept in system design.

In addition to suggesting system capabilities and providing procedures for their development, the literature (in particular that resulting from empirical studies such as the one at Michigan State University) offers important cautions to system developers.

Trzebiatowski (1967) warns, for example, that

. . . if variables which are important to the problem (i.e., the system undergoing study), are not included within the parameters of the system --or irrelevant variables are included--then efficient and effective study of the problem is made more difficult and in some cases impossible.

Synthesizing the findings of the Michigan State University system development study (Barson, 1967), Schuller

(1968) urges educators' consideration of the following points:

1. Readiness is a highly important factor in instructional development.
2. The human elements in instructional systems need to be stressed.
3. For each "what" represented by the labeled boxes or steps in the system development model, there is a "how" or a collection of strategies, tactics, approaches, and alternatives called forth to make the model work.
4. The development of the "software" is more costly and difficult than the acquiring of hardware (pp. 29-33).

Teacher Education

Both Schuller (1968) and Trzebiatowski (1967) emphasize the importance of the context in which a system functions. Trzebiatowski proposes, for example, that, for every system, there is a supra-system within which it will need to operate. Schuller expresses it somewhat differently. "The systems approach," he says, "assumes there is a 'real world' in which whatever new system may be developed will have to work" (p. 8). A system of teacher education in media, therefore, must operate within the framework of the total teacher education program and must adapt as the program changes.

A survey of the literature on teacher education suggests several current emphases, three of which are especially pertinent to this study:

1. A search by Gage (1964) and others (Bruner, 1967; Macdonald and Leeper, 1965) for a theory of instruction; an accompanying preoccupation on the part of researchers such as Taba (1965) and Flanders (1960) with description of "the teaching act."
2. A concern for making learning to teach as real an experience as possible. Dramatic evidence of the latter is provided by the proposed new standards for accreditation of teacher education (American Association for Colleges of Teacher Education, 1968) which place considerable emphasis on laboratory and clinical experiences and on the practicum component of teacher preparation.
3. An emphasis by Combs (1965) and others on making teacher education as relevant as possible to the individual prospective teacher with his unique characteristics, needs, purposes, and teaching style.

The Change Process

An innovative effort as comprehensive as that of involving previously discrete components in an instructional system demands careful attention to the change process. Whereas, in many systems change is primarily a mechanical process, in an instructional system it is

a uniquely human one, and, as such, demands that system designers have an awareness of and sensitivity to factors which encourage people to change. Reviewing the literature on the change process provides useful generalizations from the writings of Brickell (1961), Rogers (1962), Miles (1964), Lionberger (1965), Griffiths (1964), Combs (1965), Wiles (1965), and Gardner (1965).

Among those pertinent to this study are the following:

1. Innovation is more likely to occur in situations where experimentation is encouraged and where openness, flexibility, and respect for the individual exist (Gardner, 1965).
2. In every organization there are innovators and influentials with whom change agents can most profitably work, letting innovation spread from them (Wiles, 1965).
3. A temporary system, existing in a protected, enriched, autonomous environment, facilitates design of innovative programs (Miles, 1964b).
4. Linkage between the temporary and permanent systems is necessary for diffusion of the innovation (Miles, 1964b).
5. Following design of an innovation, change tends to proceed through five stages: interest, awareness, evaluation, trial, and acceptance. Innovators and change agents are most active during the first two stages. A person's reference group and his "respected other persons" are very influential at the evaluation or "decision to try" stage of innovation (Lionberger, 1965). During the trial stage adequate support in the way of consultant help and appropriate instructional materials is essential (Brickell, 1961).

Appropriate change strategies are crucial in any situation where innovative procedures are being considered. So, too, are the characteristics of the specific innovation, these providing clues to its probable success or failure. Miles (1964a), in the summary of his volume, Innovation in Education, lists several characteristics which tend to encourage adoption and acceptance of an innovation:

1. Support of values prized by the adopting group.
2. Congruence with the accepting system (relative absence of threat to existing practice or to the autonomy of people).
3. Likelihood of reducing a gap between ideals and practice.
4. Feasibility.
5. Divisibility.
6. Reasonable cost.
7. Ease of adoption.
8. Ease of use.
9. Availability of implementation supports.

It would appear that any instructional system, if it is to exist in the "real world" that Schuller describes, must be designed with the above procedures and characteristics in mind.

Summary

A search of the literature reveals a gradual growth in sophistication of the media competencies expected of

teachers. Inadequate attention has been given, so far, to appropriate methods for helping teachers develop such competencies. However, since each discrete method of competency development has proved to have certain disadvantages, leaders in the media field are currently considering a combination of methods most promising.

Planning for such a combination of methods appears to demand use of a sophisticated procedure such as the systems approach. Systems have three unique capabilities which make them appear suitable for this task: (1) they facilitate change in instruction; (2) they provide scientific procedures for making instructional decisions in the immediate future; and (3) they help planners conceptualize the interrelationships and optimum roles of system components (including men and machines). Although systems planning requires a rigorous, scientific approach, various studies (both theoretical and empirical) provide suggested procedures which have proved to be useful.

A system, to be successful, must be designed so as to function in the "real world." The literature furnishes important clues regarding both the suprasystem in which a system of teacher education in media would exist and the kinds of procedures which would be likely to facilitate change to a systems approach.

CHAPTER III

DESIRABLE MEDIA COMPETENCIES AND THEIR
ACHIEVEMENT IN PRE-SERVICE
TEACHER EDUCATION

The purpose of this study was to investigate the feasibility of a system of teacher education in media in which desired competencies in selection, production, and utilization of media were developed in existing elementary education and methods courses.

As a part of this study answers were sought to certain questions concerning media competencies. These questions, how they were dealt with, and the answers obtained are discussed in this chapter.

What competencies in selection, production, and utilization of media should be initially developed at pre-service level?

The media competencies which this study proposes for development by teachers were derived by: (1) ascertaining common elements in previously-developed competency lists, and (2) performing a task analysis of the terminal behavior expected of teachers in the

area of media utilization. Competencies identified by these procedures were submitted to teacher education and media specialists at Michigan State University for validation.

The resulting list of competencies and their rationale are:

1. Recognizing the various types of media and their characteristics.--In order to select appropriate media, teachers need to be cognizant of currently-available types. Knowledge of the characteristics of various types of media enables teachers (at least on an intuitive basis) to make a more appropriate selection of materials for a specific teaching-learning situation from among those available.

2. Recognizing instructional situations in which learner achievement can be facilitated by appropriate use of media.--Use of media is more likely to occur when teachers perceive them as making contributions to learner achievement in a specific teaching-learning situation. Teachers' perceptions of the value of media in instruction are developed through opportunities to experience their usefulness.

3. Designing clear and specific instructional objectives for teaching-learning situations.--Since effective selection and utilization of media are in

part a function of careful formulation of objectives, teachers need to develop skill in goal specification.

4. Selecting media appropriate to specific teaching-learning situations in terms of both subject and learner needs and the characteristics of the media type.--Careful analysis of an objective within a subject area (e.g., the specific concept, principle, or skill to be developed) will assist the teacher in matching characteristics demanded by the learning situation with those exhibited by the media. Analysis of the entry behavior, attitudes, and characteristics of learners will assist teachers in selecting media appropriate to those learners.

5. Locating sources of media appropriate to specific teaching-learning situations.--Familiarity with media sources contributes to greater materials use by teachers.

6. Producing simple media not commercially available.--Since commercially-prepared media appropriate for certain teaching-learning situations are not currently available, teachers and pupils will need to produce some of their own materials.

7. Utilizing media in terms both of sound principles of learning and of the instructional objectives sought.--Principles of learning such as motivation, readiness, reinforcement, and knowledge of results provide important clues for media utilization. The manner in which teachers

prepare for, present, and follow up media is, in large part, a function of these principles and of instructional objectives.

8. Utilizing appropriate combinations of media in a systems approach to instruction.--Teachers need to be competent in using media in an instructional system, either one which they design and use, one in which they collaborate with other people, or one in which they collaborate with programmed materials. Use of media in a system requires more sophisticated selection and utilization competencies than use of single media.

9. Evaluating and modifying one's use of media in terms of achievement of instructional objectives.--The desired terminal behavior of teachers in use of media is appropriate adaptation of their material selection and utilization techniques in terms of knowledge of the degree of achievement of their stated instructional objectives.

As previously noted, Meierhenry (1966) expressed concern about the rapidity with which lists of media competencies become obsolescent. Two procedures were utilized in development of this list to retard obsolescence: (1) use of general media-related tasks which would be pertinent to a variety of instructional methods, and (2) use of commonly-accepted generalizations about the relationships of media with learners, objectives,

and learning theory. This makes a competency statement somewhat more stable while permitting its application to vary with new methods and media of instruction.

The topic to which this section of the study is addressed (i.e., identification of media competencies to be developed at pre-service level) seems to infer a need for two competency lists, one for prospective and one for in-service teachers. This study, however, accepts the Meierhenry position that rapid changes in content, methods, media, and concepts of the learning process require continued development of a whole range of media competencies throughout a teacher's years of service. This suggests a single list of competencies, initially developed at pre-service level, but extended, and altered as necessary, during the total in-service period.

What do selected professors of undergraduate elementary education and methods courses at Michigan State University consider to be the optimum point or points in the elementary course sequence for initial development of the suggested media competencies?

In order to answer this question, seven professors were selected who represented the elementary education courses which appeared to be most closely related to media. These included the initial required education course, Individual and the School; the general elementary methods course, Curriculum, Methods, and Materials;

specific methods courses in the teaching of reading, mathematics, social studies, and science; and student teaching.

The Michigan State University catalog (1966) describes the content of the initial required course as follows:

Major psychological factors in the school learning-teaching situation; concepts in human development related to problems in the school situation; teacher's role in motivation, conceptual learning, problem solving, and the development of emotional behavior, attitudes, and values; learning of skills; retention and transfer; and measurement of student abilities and achievement.

Methods course content is described in this manner:

Basis, scope, and sequence of elementary curriculum, fundamentals of methods and materials; adaptation of principles of methods and materials to teaching of subject areas.

The student teaching experience is described as follows:

Participation in activities of school and community. Teaching and related activities, observation, and seminar on problems of teaching. Usually requires students to live in typical Michigan cities for an entire term. This course required for all students earning a teacher's certificate, including special education courses.

Professors with whom an interview was to be requested were selected on the basis of two criteria: (1) those who were regular users of media in their own instructional situations and/or (2) those who had been engaged in instructional development with members of the Michigan State University Instructional Media Center staff.

For purposes of identifying professors' perceptions regarding the optimum point for initial development of the competencies suggested by this study the following question was asked: "If there were an optimum point during the teacher education sequence for development of each competency, what do you think it would be?" Professors were asked to choose among the initial required education course, general methods, special methods courses, and student teaching. Since, at this time, it appeared difficult for interviewees to make a distinction between general and specific methods as they related to specific competencies, this report considers methods as one category.

Responses of the seven professors interviewed to the question of suggested placement of media competencies in the elementary course sequence are summarized in Figure 1.

Do the recommended competencies tend to fall in such a way as to suggest a logical sequence within existing courses?

Placement of media competencies within elementary courses as recommended by the professors interviewed does, in fact, indicate a logical sequence. Allocation of the first competency to two courses suggests introduction of students to various types of materials in the initial course and concentrated emphasis on media characteristics at the methods course level. During methods, too, professors suggest that prospective teachers be exposed to

FIGURE 1. SUMMARY OF JUDGMENTS OF SEVEN REPRESENTATIVE ELEMENTARY EDUCATION PROFESSORS AT MICHIGAN STATE UNIVERSITY REGARDING PLACEMENT OF MEDIA COMPETENCIES IN EXISTING EDUCATION AND METHODS COURSES.¹

Suggested Competency	Initial Required Education Course	Methods Courses	Student Teaching
1. Recognizing various types of media and their characteristics.	X	X	
2. Recognizing instructional situations in which learner achievement can be facilitated by appropriate use of media.		X	
3. Designing clear and specific instructional objectives for teaching-learning situations.		X	X
4. Selecting media appropriate to specific teaching-learning situations in terms of both subject and learner needs and the characteristics of specific media types.		X	
5. Locating sources of media appropriate to specific teaching-learning situations		X	
6. Producing simple media not commercially available		X	
7. Utilizing media in terms both of sound principles of learning and of instructional objectives sought		X	X
8. Utilizing appropriate combinations of media in a systems approach to instruction			X
9. Evaluating and modifying one's use of media in terms of achievement of instructional objectives			X

¹X denotes largest number of responses; X in two columns denotes a tie in largest number of responses.

a variety of situations in which learning can be facilitated by use of media. Since methods courses and student teaching require students to plan units, do demonstrations, and engage in actual teaching, attention to instructional objectives at these points in the elementary sequence is necessary. Once objectives have been identified, students need, in their methods courses, to gain initial experience in locating media, selecting appropriate ones, and, where needed, to gain some competency in producing their own. Utilization can begin as demonstration, tutoring, and micro-teaching experiences are provided during the elementary block, and can continue in greater depth during student teaching. Hopefully, students will, at some point in their student teaching, have an opportunity to work as part of an instructional system, learning how to collaborate with a television teacher or with programmed materials designed to accomplish a portion of the teaching task. Only as students have an opportunity to try selected materials in an actual classroom situation can they determine how effective their tools and techniques have been in accomplishing stated objectives. This kind of experience, obviously, must come during student teaching.

If competency development is conceptualized as occurring on a continuum, check marks indicating appropriate points in the elementary sequence for development of specific media competencies should be considered as points for initial development. This suggests that further

development of the particular competency continues throughout the remainder of the pre-service period and on into the in-service period as required by the individual to operate effectively in the teaching-learning situations in which he becomes involved.

Summary

This study is based on the assumption that there are certain basic competencies in the selection, production, and utilization of media which all teachers should be expected to develop, such development to begin at the pre-service level and continue thereafter on an in-service basis.

Judgments of representative elementary education professors at Michigan State University regarding optimum points in the elementary course sequence for initial work on the proposed competencies indicate that they tend to fall into a logical sequence. This sequence will be applied in the following chapter in an analysis of the feasibility of a systems approach to media competency development at Michigan State University.

CHAPTER IV

DEVELOPMENT OF A SYSTEM OF TEACHER
EDUCATION IN MEDIA

As previously indicated, the literature on systems suggests potentially useful procedures for those engaged in instructional system design. These procedures can be subsumed under five major categories: goal identification, system analysis, system synthesis, try-out and evaluation, and system revision.

For purposes of this study, use of these procedures will be illustrated in considering the system of teacher education in media at Michigan State University.

Goal Identification

Goal identification consists of three elements:

1. Specification of desired outcomes of the system under consideration,
2. Description of the present situation, including the degree to which specified goals are being achieved, and
3. Analysis of the problem, including reasons for any current inadequacies in goal achievement.

Each of these will be discussed as it relates to the system of teacher education in media at Michigan State University.

Specification of Desired Outcomes

Decisions regarding desired outcomes of a system of teacher education in media at Michigan State University should be made by a committee composed of representatives of the staff of the Instructional Media Center, the Instructional Resources Center of the College of Education, and the education and methods courses involved in the system.

For purposes of the present study, desired outcomes were specified in terms of competencies to be developed. The suggested competencies are as follows:

1. Competency in recognizing various types of media and their characteristics.
2. Competency in recognizing instructional situations in which learner achievement can be facilitated by appropriate use of media.
3. Competency in designing clear and specific instructional objectives for teaching-learning situations.
4. Competency in selecting media appropriate to specific teaching-learning situations in terms of both subject and learner needs and the characteristics of specific media types.

5. Competency in locating sources of media appropriate to specific teaching-learning situations.
6. Competency in producing simple media not commercially available.
7. Competency in utilizing media in terms both of sound principles of learning and of the instructional objectives sought.
8. Competency in utilizing appropriate combinations of media in a systems approach to instruction.
9. Competency in evaluating and modifying one's use of media in terms of achievement of instructional objectives.

Competencies, once identified, can be converted rather easily into measurable objectives, especially if they were initially stated in the form of tasks to be performed. Mager (1962) suggests that a well-written instructional objective should include statements of the terminal behavior expected of the learner, the conditions under which the behavior will be expected to occur, and the criteria of acceptable performance.

Conversion of competencies to behavioral objectives can be illustrated by use of one or two of the competencies identified for this study. Competency #1, for example, can be converted into the following objectives:

Shown a number of types of media, the prospective teacher will be able to identify each one correctly.

Provided with a list of media types and a list of characteristics, the prospective teacher will be able to identify at least five characteristics pertaining to each type.

Conversion of competency #3 would result in the following objective:

Given a description of a group of learners and of the instructional situation, the prospective teacher will be able to formulate several instructional objectives for the situation, these being stated in behavioral terms.

Designers wishing to evaluate a system both in terms of achievement of hoped-for output and also in terms of exemplification of important human values should formulate key questions concerning those values. The questions can, if desired, be restated in terms of behaviors to be expected if the system does, in fact, exemplify the desired values. Some important considerations for system designers are whether the system:

- (1) adapts to the needs of students with varying backgrounds, attitudes, and perceptions in relation to media,
- (2) encourages its human components to function in a creative fashion,
- (3) utilizes the unique capabilities of both teachers and media,
- (4) facilitates better communication and cooperation among its components,
- (5) facilitates analysis of when and how it needs to change.

One of the advantages of a system of teacher education in media is that agreements are made regarding competencies to be developed in specific courses in the education sequence. These competencies, when integrated in a course, must be developed in relation to the objectives of the professor. General objectives, derived from the suggested competencies, need, therefore, to be stated more specifically when the instructional development specialist begins to plan with the professor for self-instructional programs for that course.

Description of the Present Situation

Once objectives have been identified, the existing situation should be described and evidence obtained as to the present degree of achievement of specified goals.

Several types of experience, not closely connected, contribute to the development of media competencies by prospective teachers at Michigan State University. They include: a basic media course (elective), a self-instructional media laboratory, education and methods courses, and student teaching. Their contributions to students' media competencies can be described briefly as follows:

1. Basic media course (elective).--The basic course is described in the Michigan State University catalog

(1966) as being concerned with "audiovisual materials and techniques for pre-service teachers." Topics considered include, besides projector operation, selection, sources, and techniques for effective utilization of flat pictures, slides, filmstrips, motion picture films, recordings, models, radio, television, field trips, and other media types. One section of the course is offered during each of the fall, winter, and spring terms. During the 1967-68 year, it was taken by about 245 prospective elementary and secondary teachers.

2. Media laboratory.--The self-instructional media laboratory, occupying a section of the Instructional Resources Center of the College of Education, was started on an experimental basis by IRC director, Dr. James Page, during the 1966-67 school year. Now equipped with sixteen permanent carrels, the laboratory is used for various purposes, one of which is to assist nearly all prospective elementary teachers in gaining competence in operation of basic kinds of audiovisual equipment.

3. Education and methods courses.--The education and methods courses preceding student teaching assist those students unable to incorporate a basic media course in their schedules in acquiring some knowledge regarding media selection, production, and utilization. Because the amount of background students acquire in this manner has not been formally identified, this study has sought

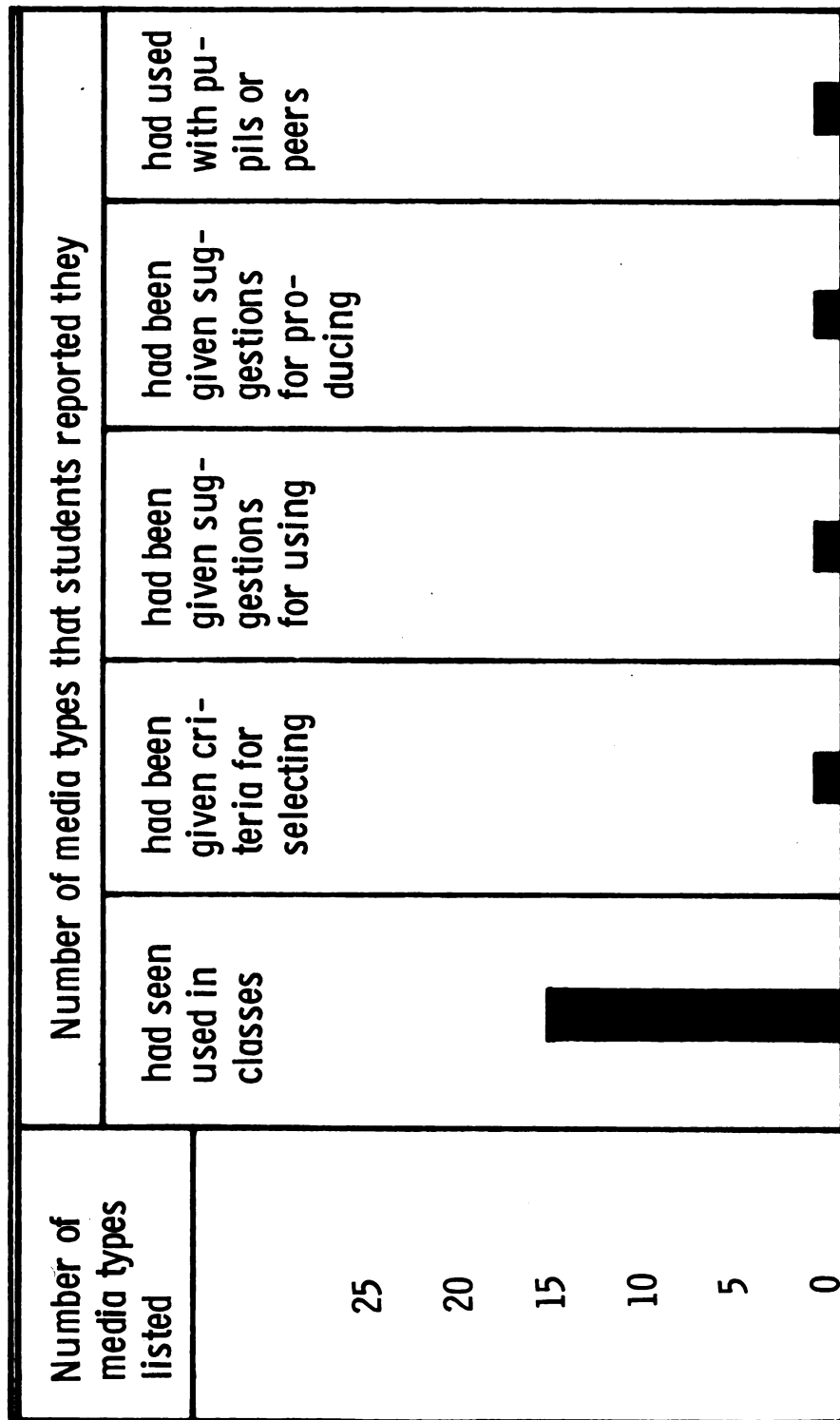
to determine it in two ways: by surveying previous media experiences of students involved in the pilot study for this dissertation, and by interviewing representative professors of pertinent education and methods courses regarding their perceptions of the degree of media competency development among prospective elementary teachers. Findings of the two surveys are as follows:

The student survey.--Results of the survey of media experiences reported by students who had not had student teaching are shown in Figure 2.

Students were given a list of twenty-five types of media and asked to indicate with which they had had the specified kinds of experiences. It will be noted that at least half of the students reported having seen fifteen of the media types used by professors in classes. For none of the media types had at least half of the students been given selection criteria, utilization suggestions, or production suggestions. None of the media types had been used by at least half of the students in demonstrating something to pupils or to peers in a college class. This indicates that, prior to student teaching, many of the media competencies still require development.

The faculty survey.--In the faculty survey, staff members were asked to react to the following question: Please indicate your perception of the degree to which each of the following specific competencies has been

**FIGURE 2 : MEDIA EXPERIENCES REPORTED BY AT LEAST HALF OF 35 STUDENTS
(PRE-STUDENT TEACHING LEVEL) ENROLLED IN TWO CHILDREN'S
LITERATURE CLASSES AT MICHIGAN STATE UNIVERSITY AT BEGIN-
NING OF SPRING TERM , 1968**



developed by students when they enter your class. Use a 5-point scale as follows: 1 = well-developed, 2 = somewhat developed, 3 = may or may not be developed, 4 = probably not developed, 5 = definitely not developed. (Competencies to which staff members reacted were the nine listed on pages 48-49.)

In the faculty survey, one professor of each of the following courses was interviewed: Individual and the School (the initial required education course); Curriculum Methods and Materials (the general elementary methods course); methods courses in mathematics, reading, science, and social studies; and student teaching. Findings of the faculty survey are reported in Figure 3.

It is of interest that faculty members, interviewed independently, perceive growth between the time of entry in the education sequence and the beginning of student teaching in such basic competencies as recognizing media types and their characteristics, recognizing instructional situations in which media can facilitate learning, and specifying clear objectives. However, in only one case do they perceive the competency as well developed at the pre-student teaching level.

It will be noted that, across all groups, the selection, utilization, and evaluation competencies are considered to be least developed, having been placed in all instances, either in the "probably not developed" or

FIGURE 3. DEGREE TO WHICH REPRESENTATIVE ELEMENTARY EDUCATION PROFESSORS AT MICHIGAN STATE UNIVERSITY PERCEIVE MEDIA COMPETENCIES TO HAVE BEEN DEVELOPED WHEN STUDENTS ENTER THEIR CLASSES.

Competency Number	Well- Developed	Somewhat Developed	May or May Not Be Developed	Probably Not Developed	Definitely Not Developed
1	ST	IC		M	
2			ST	M, IC	
3		ST		M	IC
4				ST, M	IC
5		ST	M		IC
6		ST	M, IC		
7				ST	M, IC
8				ST	M, IC
9					ST, M, IC

IC - initial course professor M - methods professors

ST - student teaching professor

"definitely not developed" categories. This finding appears consistent with the reported experiences of the pre-student teaching group in the previous survey. In regard to production competencies, however, the responses of the two groups are in disagreement, faculty members appearing to believe students have more production experience than students report.

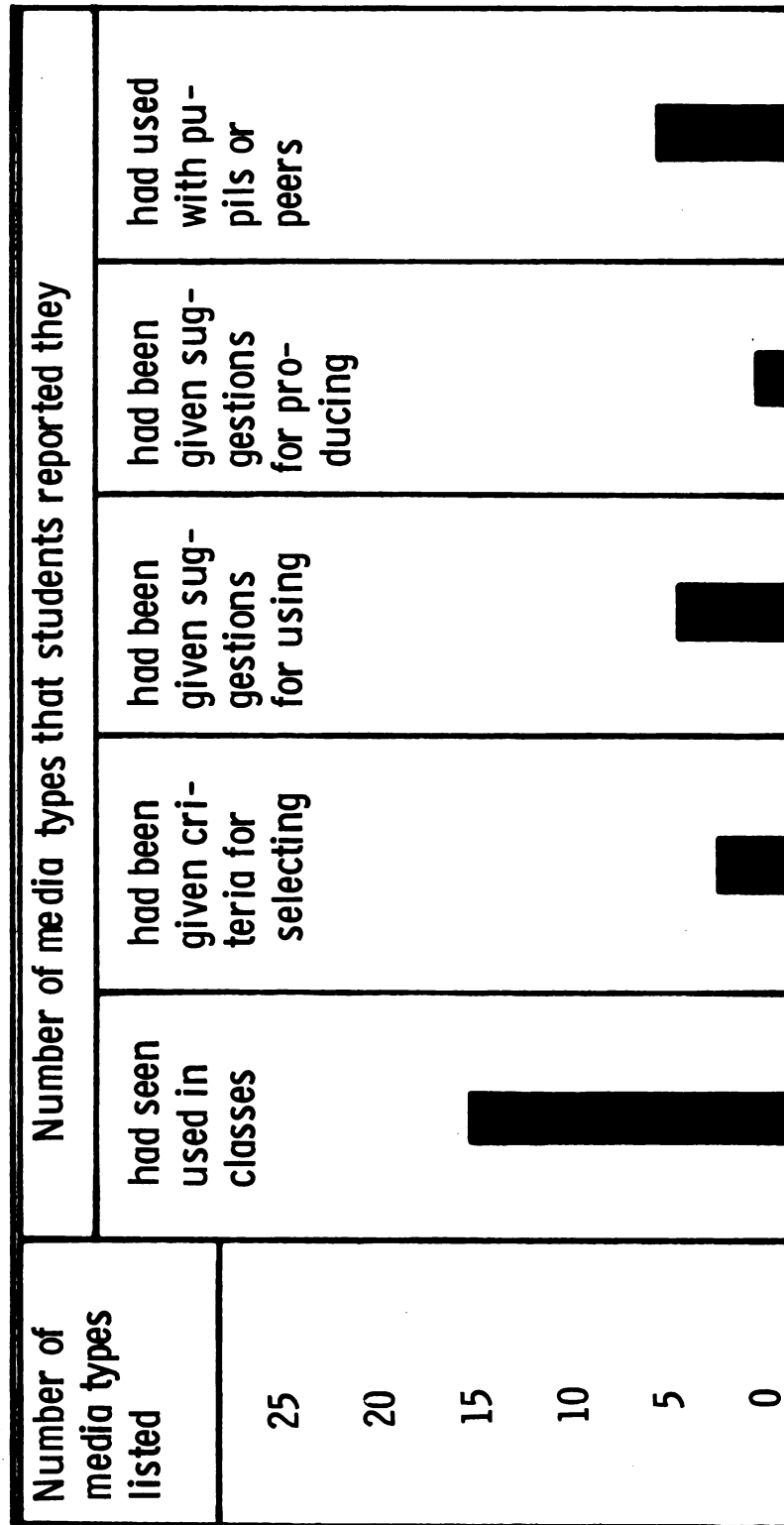
In summary, it will be noted that, of twenty-seven judgments made as to degree of competency development, five list competencies as developed, four as either developed or not developed, and eighteen as not developed.

4. Student teaching.--A student teaching experience is generally considered to provide an opportunity for application of theory to practical problems. Study of responses in the student survey indicates that, in this case, student teaching provided both suggested methods and opportunities to apply them (see Figure 4).

Comparison of findings reported in Figure 4 with those in Figure 2 suggests that students receive more guidance in selection and utilization of media and more actual experience in media use during student teaching than when enrolled in education and methods courses.

In the process of development of a system of teacher education in media, description of the present situation should be followed by analysis of the problem as it presently exists.

FIGURE 4: MEDIA EXPERIENCES REPORTED BY AT LEAST HALF OF 37 STUDENTS (POST-STUDENT TEACHING LEVEL) ENROLLED IN TWO CHILDREN'S LITERATURE CLASSES AT MICHIGAN STATE UNIVERSITY AT BEGINNING OF SPRING TERM, 1968*



* Includes those with teaching experience

Analysis of the Problem

Analysis of the previously-reported surveys indicates that, even at the beginning of student teaching, students are perceived to have only one of the nine suggested competencies well developed, only three somewhat developed, three still probably not developed, and one definitely not developed. Prior to student teaching, the seventy-two students in the two classes surveyed reported few media experiences other than seeing media used by their professors. After student teaching, they still reported media experiences with only about 20 per cent of the media types surveyed. This lack of experience with media can be attributed, in part, to the following conditions:

1. The basic media course is presently taken by about 10 per cent of the prospective teachers.--
This course is not presently required in the elementary program. During the 1967-68 year about 245 students were enrolled, this figure being a rather small percentage of the approximately 2400 prospective teachers graduating from Michigan State University. Among the reasons for low course enrollment is the fact that elementary students have few elective hours, some, such as those enrolled in special education, having none at all.

2. Education and methods course professors do not currently contribute extensively to development of selection,

production, and utilization competencies.--Since many students do not presently take the media course, the task of competency development falls on education and methods professors. Both the student and faculty surveys indicate that, although professors are using media extensively in their classes, they are presently providing inadequate assistance to students at the pre-student teaching level in development of the identified media competencies. It must be noted that, up to the present time, no agreement has been made among instructors regarding media selection, production, and utilization competencies to be emphasized in specific courses. It must be further noted that, in the case of equipment operation competencies, development of which the elementary staff has agreed should be allocated to the methods block, nearly 100 per cent of the elementary students are gaining the desired skills.

3. Back-up materials for development of selection, production, and utilization competencies in education and methods courses have been limited.--An important factor in the successful development of equipment operation competencies has been the availability of self-instructional packages on the basic types of projection equipment. Such packages have not been available (with the exception of one series prepared by social studies staff members) for helping students develop desired competencies in selection, production, and utilization of media. A favorable

attitude toward self-instructional materials by those professors interviewed, together with requests for additional multi-media packages, is indicative of a desire for more adequate back-up materials.

4. Limited media staff in the Instructional Resources Center of the College of Education.--The fact that preparation of ten self-instructional programs for the physiology preparation laboratory required frequent meetings of the Media Center instructional development team, half time of an instructor (for six months), and extensive assistance from Media Center graphics personnel indicates that design of media packages is a time-consuming task. Development of the self-instructional programs needed for substantial emphasis on media competencies in education and methods courses cannot be accomplished with the present Instructional Resources Center staff.

System Analysis

Various system designers have suggested that, before a model of a new system can be derived, attempts at system analysis must occur. One method of accomplishing this is through examination and choice among alternative solutions to the problem (Schuller, 1968).

Examination and Choice
Among Alternative
Solutions to the
Problem

Among possible solutions to the problem of adequate media competency development on the part of prospective teachers at Michigan State University are the following:

1. A basic media course for all students.--At the 1958 Lake Okoboji Audiovisual Leadership Conference (Allen, 1960) participants suggested that, of available alternatives, a basic media course appeared to offer a means of providing the most comprehensive development of competencies. Such a solution to the problem of competency development at Michigan State University would necessitate revision of the elementary course sequence in such a manner as to make a media course mandatory and to permit students to incorporate it in their schedules. In view of increasing demands for new courses in a variety of areas, this solution seems unlikely at the present time.

2. Total development of media competencies in education and methods courses.--Okoboji participants (Allen, 1960) considered total integration of media and methods to be, theoretically, the best choice among procedures for competency development. They did, however, recognize various problems inherent in this approach including those of coping with differing degrees of media sophistication on the part of staff members and planning satisfactory procedures for evaluating competency

development. In considering this solution to the present problem, it appears unreasonable to expect professors of education and methods courses at Michigan State University to assume the total task of media competency development in addition to their other instructional responsibilities.

3. Total development of media competencies by means of self-instructional programs.--The Torkelson (1965) study of alternative methods of competency development pointed to certain advantages of self-instruction in the area of information transmission and attitude development. Research in use of self-instructional programs for assisting students in application of principles to new situations, however, is inconclusive, Pressey's (1950) studies showing that programs can, in fact, be used in this manner, Torkelson's (1965) tending to question this use. Other studies indicating the advantages of group rather than individual problem-solving appear to support a thesis that self-instructional programs, although capable of making an extensive contribution to media competency development, are not an appropriate means of achieving the entire task (Wallen and Traverse, 1963).

4. Total development of media competencies in student teaching.--Since the survey of previous media experiences of students in the two children's literature classes involved in this study revealed that post-student

teachers reported more experiences with use of materials than did pre-student teachers, we can assume that student teaching provides essential opportunities for application of media selection and utilization principles. Deferring the total task of competency development to the student teaching term, however, has several disadvantages. Besides placing additional burdens of information transmission on supervising teachers, it tends to limit the length of time that students can experience use of media in a first-hand situation.

5. Development of media competencies by a combination of approaches including self-instruction, interaction in education and methods courses, direct experience in student teaching, and possible enrichment experiences in an elective media course.--A systems approach to development of media competencies would, presumably, enable educators to take advantage of the strengths of various approaches to competency development and to identify appropriate relationships among them. To this end, attention will now be directed to system design procedures in further study of the problem of development of media competencies on the part of prospective elementary teachers at Michigan State University.

Identification of Functions
of a System of Teacher Edu-
cation in Media

Theory suggests that one of the most useful procedures in system design is analysis of the functions that the proposed system is expected to perform. Such functions for a system of teacher education in media should include the following:

1. To help prospective teachers become oriented to the media field and to media services available to them at Michigan State University.--Throughout the professional education sequence prospective teachers should be involved in experiences which provide a real need for use of media. An introduction to media types, to the rationale for use of media, and to facilities and services of the Instructional Resources Center of the College of Education should be provided for all students early in the education sequence.

2. To present a variety of models of media use for consideration by prospective teachers.--Combs (1965) proposes that prospective teachers should be "surrounded with rich opportunities to see the kinds of methods and materials other people have found useful" (p. 109). Exposure to models of good teaching with media should begin with the first course in the education sequence and continue through all succeeding courses. As was pointed out by one of the professors interviewed, when

instructors use media with prospective teachers, they should reserve time for discussing why the particular media type was selected and why it was used in the manner that it was. Carefully planned observation experiences should be developed to show in-service teachers utilizing media effectively in public school classrooms. Such observation, as studies reported by Schueler and Lesser (1966) indicate, can be presented live or in the form of filmed, televised, or videotaped lessons. It is assumed that each prospective teacher will see enough models of media use to enable him to begin to identify those procedures most compatible with his teaching style.

3. To provide for the development of those motor skills required for effective utilization of media.--
Skills in operation of the basic kinds of projection equipment are currently being developed by prospective teachers at Michigan State University by means of self-instructional programs used in a carrel setting. These skills are basic to other self-instructional experiences with media. Skills related to operation of production equipment such as dry mounting presses, laminating machines, and transparency-producing equipment are also needed by prospective teachers as they begin to prepare their own materials for teaching-learning situations in which they are involved.

4. To assist students in gaining pertinent knowledge about media.--As the kinds of experiences in which prospective teachers engage during methods courses help them become aware of a need for media use, they will require additional information about media characteristics, selection, and utilization. Such information should be available to individual students or student committees when needed and in a form that will permit them to discover its relationship to goals and purposes that are of concern to them.

5. To provide for development of those intellectual skills required for effective utilization of media.--Bloom and his associates (1956) divide cognitive objectives of education into two groups: (1) knowledge, and (2) intellectual abilities and skills. It is obvious that knowledge is of little value unless students develop adequate ways of using it. They must, in the case of media, be able to utilize facts in developing concepts and generalizations. They must be able to draw inferences from known information, identify the implications of media for new situations, and apply principles of media selection and use to their own instructional problems.

6. To facilitate students' application of media knowledge and skills to a variety of instructional situations.--In the final analysis, the best test of the effectiveness of a system of teacher education in media

is the way in which teachers apply their media knowledge and skills in real-life situations. A teacher education in media system must provide many and varied situations in which prospective teachers can try their skill, evaluate their achievements, and modify their procedures accordingly.

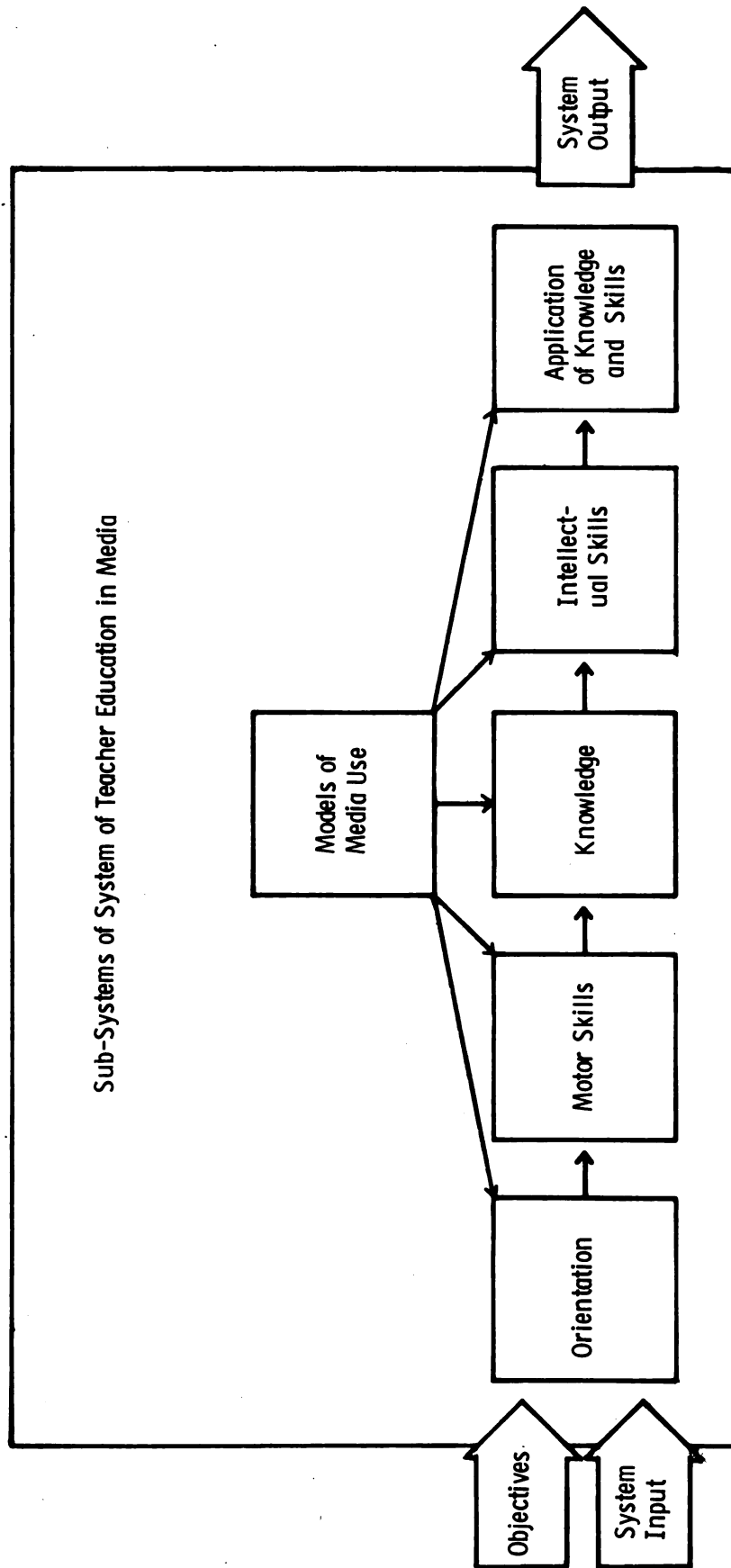
Identification of Sub-Systems of a System of Teacher Education in Media

One of the analysis procedures designed to facilitate systems use is identification of appropriate sub-systems. This can be done, according to Trzebiatowski (1967) on the basis of functions, inputs and outputs, use of common processes or techniques, or some other means. It is suggested, for purposes of the present study, that the proposed system of teacher education in media be divided into sub-systems according to function. The sub-systems proposed included: orientation, models of media use, motor skills, knowledge, intellectual skills, and application.

System Synthesis

Once sub-systems are identified, conceptualization of the new system can begin. Development of a model of hypothesized relationships among elements is a useful procedure for system designers. Figure 5 illustrates

FIGURE 5: MODEL OF SYSTEM OF TEACHER EDUCATION IN MEDIA



*Feedback may and should occur at almost any point in the system. With this understanding, feedback lines are purposely omitted from the above model to avoid visual confusion.

a logically-organized model for a system of teacher education in media based on the functions previously described.

Model of a System of Teacher Education in Media

Systems are described by Trzebiatowski (1967) as being open or closed, an open system having inputs from and outputs to its environment. A system of teacher education in media is, of necessity, an open system. Among its inputs are the following: stated objectives, student entry behavior (i.e., skills and competencies), funds for system development, and research results pertinent to its development. One of the more important inputs of this type of system is the group of attitudes toward media that students exhibit. Obviously careful and accurate identification of inputs is essential to successful operation of the system.

Conceptualization of the system of teacher education in media must inevitably include analysis of relationships among sub-systems. With the exception of the sub-system of models of media use, a linear relationship with feedback loops exists in the system being designed.

While entry into an established system (e.g., the Michigan State University Instructional Development System) may occur at numerous points, development of a

new system requires that planners clearly identify their goals before the system is designed and put together. When a system is organized in a logical fashion, inferences are made as to the order in which functions need to occur, and sub-systems are so arranged.

It is obvious that orientation to the media field and to services at the university must occur early in the teacher education sequence. In a system organized to give students many first-hand experiences with media, they will need competencies in operation of both projection and production equipment, and motor skill training in both of these areas should occur early, probably immediately following orientation. As prospective teachers find themselves needing to solve real problems involving media (e.g., tutoring a child in a classroom or demonstrating use of media for developing a specific concept in a methods course), they will want pertinent knowledge about media, assistance in thinking about the implications of the knowledge for their specific problem, and an opportunity to test their proposed problem solution and evaluate its effectiveness in terms of goal achievement. In a logically organized system the knowledge sub-system would precede the intellectual skills sub-system which would, in turn, precede application. Knowledge of the results of application would provide feedback into the system, this being useful both to system designers and to the student

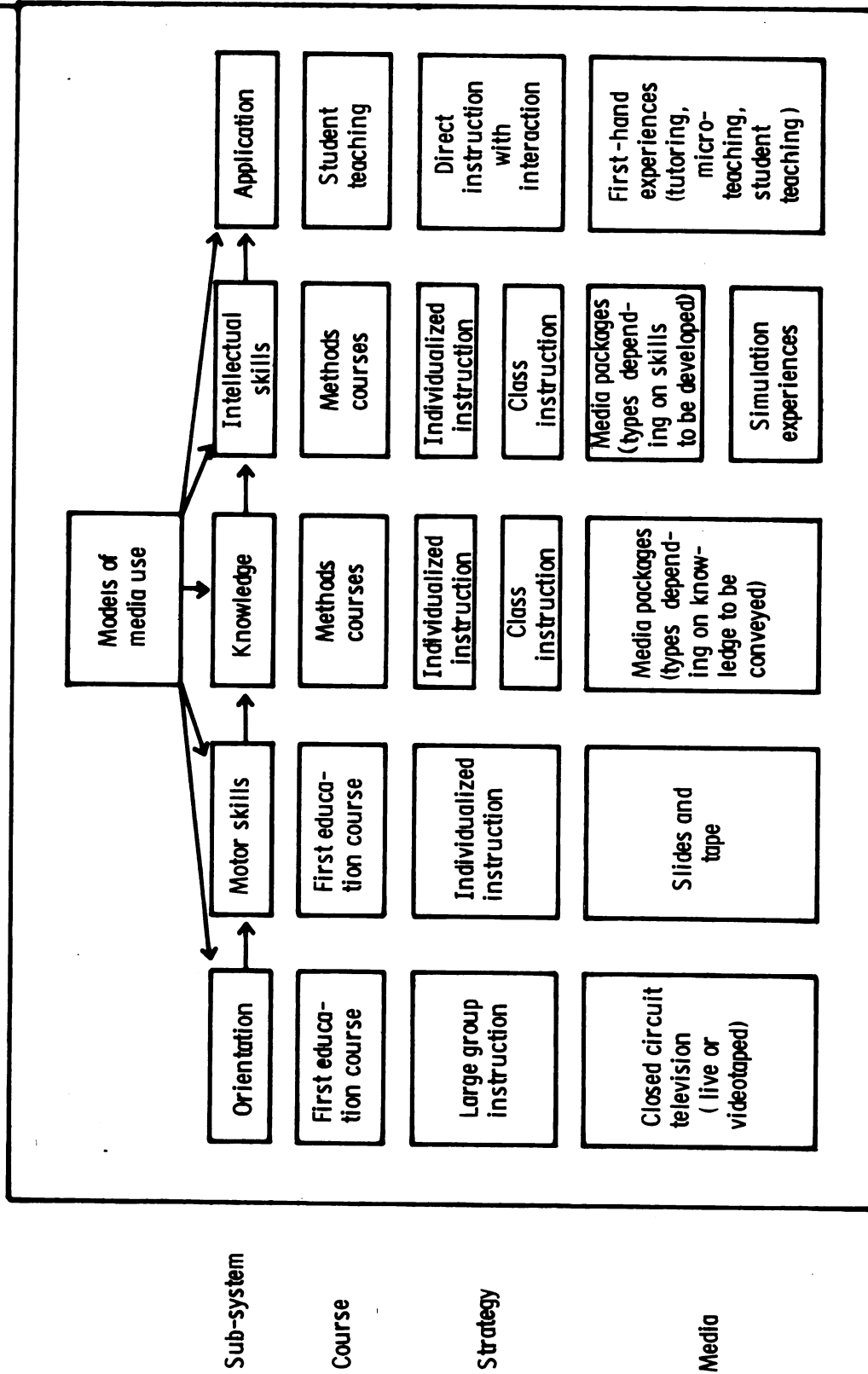
in future encounters with media. Models of media use (i.e., demonstrations by professors and elementary public school teachers) should be made available to students at all points in the system, these influencing each of the other sub-systems.

Because the system of teacher education in media is an open one, output from the system is returned to the environment. This is usually identified in terms of the exit behavior resulting from new knowledge, competencies, and skills. Since the study by Torkelson (1965) makes clear the crucial role played by attitudes in determining teachers' decisions to use or not to use media in their classrooms, these are a particularly important type of system output.

Identification of Relationships Between Sub-Systems and Courses

Once the system is conceptualized and relationships of sub-systems identified, attention must be given to appropriate relationships among sub-systems and courses in the elementary education program. It would appear logical, if students are to obtain maximum value from media during the total education sequence that orientation should occur in the first required course. At Michigan State University this is the course on the Individual and the School. It would also seem important that the motor skills related to projection and production

FIGURE 6: IMPLEMENTATION OF SYSTEM OF TEACHER EDUCATION IN MEDIA*



*Feedback may and should occur at almost any point in the system. With this understanding, feedback lines are purposely omitted from the above model to avoid visual confusion.

be acquired at this point so as to be available to students in ensuing courses.

Reference to professors' recommendations regarding optimum points at which to introduce the competencies suggested by this study indicates that much of the knowledge about media be transmitted at the methods course level. This level also is an appropriate one for developing students' intellectual skills in the media area, these being essential to later application of media to real-life problems.

Finally, the experiences in which students are involved in actual classroom situations--tutoring, micro-teaching, and student teaching--lend themselves best to application of media knowledge and skills. At Michigan State University limited amounts of these experiences are included in the methods block and much more extensive amounts during the student teaching term.

Selection of Instructional Strategies

Identification of appropriate relationships among media functions and courses and media competencies and courses, permits attention next to suitable instructional strategies. Trzebiatowski (1967) contends that no definitive studies have been conducted which provide guidance in selection of appropriate strategies for

specific types of instructional situations. The system designer, therefore, must make his selection on the basis of such criteria as:

1. the limited research evidence available,
2. the number of students to be served,
3. the extent of need for interaction, and
4. the extent of need for first-hand experience.

Because all elementary education students need orientation to media and because, they tend to have many common concerns, it appears that an appropriate strategy for the first sub-system would be large group instruction.

Development of motor skills, conversely, demands opportunities for students to be able to proceed at rates appropriate to them. The motor skill sub-system, then, would appear to function most effectively when an individualized instruction strategy is utilized.

Research studies as reported by Lumsdaine (1963) and others, indicate that information can be made available as well by programmed materials as by conventional instruction. This appears to suggest that much of the knowledge about media which prospective teachers seek can be gained from self-instructional packages in a carrel setting, individualized instruction being an appropriate strategy. If, however, all students require the content being transmitted, and if the professor can allocate time to this purpose, class instruction may, at times, be more efficient.

The appropriate strategy for development of intellectual skills is not easily identified. Pressey's (1950) studies, for example, show that students can develop this kind of skill through use of printed materials and adjunct questions. Torkelson's (1965) research, on the other hand, suggests that information involving conceptualization of the role of media in instruction seems to demand student-teacher and student-student interaction. These diverse findings indicate that, perhaps, a combination of self-instructional programs and class interaction is most appropriate for the function of development of intellectual skills. Simulation experiences (in an individualized or group setting) should also be an aspect of development of intellectual skills.

Application of media skills requires a special kind of strategy which, for purposes of this study, will be labeled direct experience involving interaction. This is no longer simulation, but rather is involvement in an actual instructional situation. In order that the prospective teacher can improve his application techniques, he needs not only to engage in self-evaluation but to receive feedback from others--students, teachers, supervisors, or all three--on the adequacy of his procedures. This kind of direct experience and interaction can occur in tutoring, micro-teaching, student teaching, or internship situations.

Selection of Media Types

Gerlach (1966), in discussing selection of appropriate media for specific instructional situations, suggests that there is no research indicating any media type better for a particular kind of situation than any other. Media selection, he adds, is accomplished primarily on the basis of convenience.

System designers, then, must select media types largely on an intuitive basis. Allen (1952) and Meierhenry (1966), among others, have urged extensive research in the area of media characteristics and the relationship of these characteristics to specific kinds of teaching tasks.

Wendt and Butts (1962) suggest that student characteristics are also of importance in determining the types of media most appropriate for certain situations. Some research evidence supports this point of view, studies showing, for example, that abler students prefer the branching type of self-instructional program and that high-anxious students benefit from more feedback and knowledge of results (Briggs, 1967).

On an intuitive basis, it appears that certain types of media are more appropriate for certain instructional purposes than others. For example, motion pictures (combining sound, motion, commentary, music, and color) seem more useful for introducing and motivating interest

in a unit than do diagrams; and objects which can be manipulated appear more helpful in developing initial understanding of mathematics processes than do symbolic materials.

In the absence of definitive research, we must use the common sense approach which good teachers have always used with respect to methods and materials, abetted by our own extensive experience. This means that media should be selected as a result of considering:

1. types of media having characteristics demanded by the specific instructional situation,
2. types of media appropriate for students with specific characteristics, and
3. types of media appropriate for specific instructional purposes.

In considering proposed media types for the previously-identified strategies for a system of teacher education in media, these principles are of assistance. Orientation to media and media services requires a medium appropriate for a large group--one that incorporates brief examples of a number of media types being used in a variety of situations. It demands, also, a medium that can introduce students to the various areas and services of the College of Education Instructional Resources Center. The media type which can most effectively combine such a variety of experiences appears to be closed circuit television, videotape probably being used to enable the presentation to be carefully programed and recorded in advance.

Development of motor skills seems to require several types of media experiences. First, because equipment operation involves motion, short cartridge type motion pictures might be used for introducing each process. Then, because students progress at varying rates during practice sessions, devices such as captioned slide sequences which permit speed regulation by the student, seem necessary. And finally, first-hand experience is essential in actual development of the skill by the prospective teacher.

Many media types have proven to be useful in gathering information, the appropriate type, in this case, depending primarily on the content to be attained. In a program, for example, on use of tape recordings, the content (including excerpts from sample tapes) can be attained most effectively by the medium itself. Programs on use of such visual devices as bulletin boards, flannel boards, and maps may require a visual medium whose speed is user controlled (e.g., slides) accompanied by an audio commentary (e.g., a tape recording). A program on use of media in teaching a unit may require a combination of media types with an accompanying tape. To facilitate use of such a program, it can be placed on film or videotape. To make media packages appropriate for different users, they can be developed as branching-type programs or organized in modular form, allowing students to enter the program at different points.

Media types for developing intellectual skills can, like those for gathering information, be varied. Researchers, such as Taba and Suchman, have done useful experimentation on development of intellectual skills, Taba (1965) working on techniques for developing concepts, drawing inferences, and applying principles, and Suchman (1964) stressing inquiry learning. With an 8 mm film and tape package a prospective teacher can be helped to analyze techniques for using films to stimulate inquiry. Following this a simulated situation, depicted by means of a sound film or a slide and tape package, can test the student's ability to apply inquiry techniques to a hypothetical situation. A flat picture and audiotape package can be used to introduce a student to Taba's techniques for concept development, the student later using these procedures in a class demonstration and benefiting from interaction with the teacher and other students.

Media for the application sub-system cannot be specified as they depend entirely on the multiple variables in the situation (i.e., the objective to be achieved, and the types of learners involved).

Identification of competencies for development in each group of courses helps in determining knowledge to be attained and intellectual skills to be developed. In some cases a group of media programs can be shared by several courses. In others specific programs for developing competencies in ways appropriate to a specific course

may be required (e.g., a social studies course in which students are required to develop a unit may need a program showing how media can be incorporated in a unit).

An instructional development person should be available to work, on an invitational basis, with each staff member in identifying the specific competencies and objectives required in his course and in preparing self-instructional programs to be used in achieving the objectives.

Try-Out and Evaluation

A system of teacher education in media, like any other, must be tried out and evaluated. Therefore, one elementary methods course at Michigan State University was selected in which to test the procedures proposed in this study. During spring term, 1968 a pilot study was conducted using two sections of the course in Education 325C, Children's Literature, taught by Dr. Jean LePere.

Goal Identification

When a plan is formulated to incorporate development of media competencies in existing education and methods courses, there must, first of all, be agreement regarding the competencies to be emphasized in specific courses. These competencies, preferably stated in behavioral terms, plus the professor's course objectives then become the system goals for that course. It must be understood,

however, that a professor's goals for his course are paramount. Discussion between him and the instructional development specialist should seek to identify ways in which specific media competencies can best be related to these goals, and experiences, including supportive media packages, should be developed accordingly.

Dr. LePere's course,¹ being very well planned, had several stated objectives. In attempting to provide

¹The course in Children's Literature for the undergraduate student has a two-fold purpose. As a survey course it is designed to assist teachers-in-training in becoming acquainted with the great wealth of trade books which are available for today's children. At the same time its purpose is to assist future teachers so that they may guide children toward more comprehensive, creative, and insightful utilization of these materials in the classroom setting. With these objectives in mind, a variety of activities have been planned for students enrolled in the course.

The development of a project in connection with the utilization of children's books in the classroom is to be accompanied by a research paper on the topic selected by the student.

AIMS AND OBJECTIVES OF THE PROJECT

- A. To become well acquainted with a special area of children's literature.
 1. Outstanding authors and illustrators in your particular field.
 2. Selecting the outstanding as well as other useful materials.
 3. Research indicating some idea of the scope of the field.
- B. Learning how to use children's literature through experience in developing:
 1. Motivational techniques that entice children to read.
 2. Methods that enhance learning and broaden knowledge and comprehension.

meaningful experiences for her students in connection with these objectives, she encouraged them to select an area of children's literature of particular interest to them, identify pertinent teaching-learning objectives in this area, explore ways in which media might be utilized in helping children grow in understanding and enjoyment of literature, and present their findings for other members of the class.

As previously stated, media goals for a course are derived from the competencies selected for development at that level. Competencies which professors assigned to the methods block included ones on types and characteristics of media, teaching-learning situations requiring media, instructional objectives, and media sources, selection, production, and utilization.

Description of the present situation.--Since the total system of teacher education in media had not been in operation, it could not be assumed that students had

3. Means of helping children to share books with others.
 4. Correlation between literature and the entire curriculum.
- C. Sharing findings with others in order to broaden our concept of the entire field of children's literature.
1. Classroom Presentation
 - a. Panel Discussion
 - b. Skits
 - c. Dramatizations
 - d. Role Playing
 - e. Videotape
 - f. Simulation of a classroom situation
 2. Mimeographed Materials

been exposed to basic media types in the initial education course or to certain other competencies in other methods courses. Therefore, it was important to ascertain students' entry behavior in regard to proposed competencies prior to designing media experiences for the children's literature course.

Entry behavior of students was identified in two ways: (1) by noting that all students had been enrolled in the initial education course, one which deals with educational psychology and human growth, and that some background might be assumed with regard to development of instructional objectives, understanding of pupil needs, and knowledge of principles of learning, and (2) by conducting a survey to ascertain students' previous experience in the media area.

Results of the survey, reported earlier in this chapter, indicated that pre-student teaching students had been given little assistance with media selection, production, and utilization while post-student teaching students had experienced a limited amount of help in these areas. Further checking on media background revealed that only three of the approximately seventy-two students in the two children's literature classes had taken (or were taking) a media course. On the basis of their reported experiences, it seemed necessary to provide students with a rather broad base of activities in selection, utilization, and production of media.

System Analysis

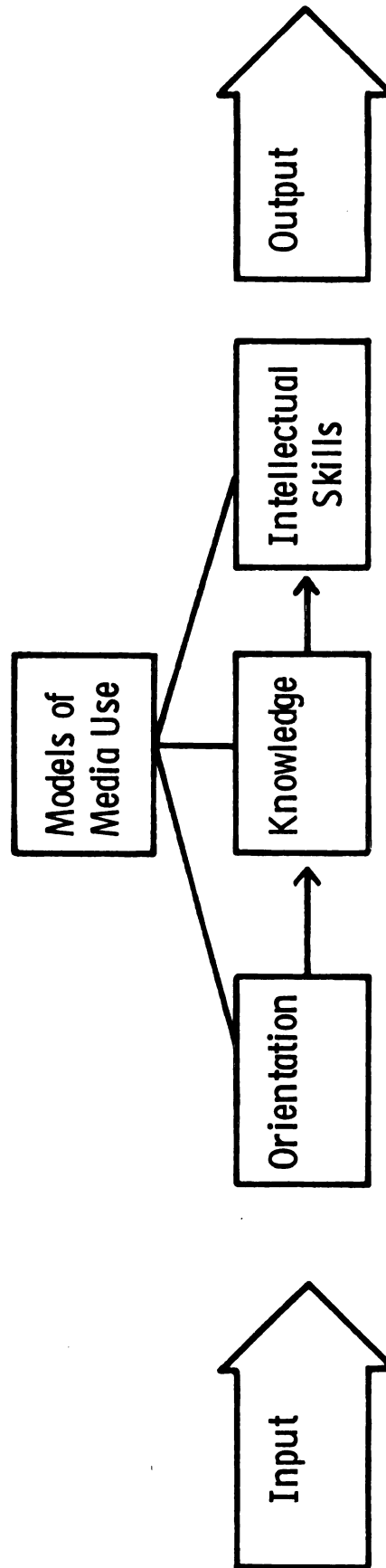
Identification of functions.--In the previous discussion of the total system, the following functions were proposed: models of media use, orientation, motor skills, knowledge, intellectual skills, and application. Those suggested for the methods courses were: knowledge and intellectual skills. Since students had not experienced orientation to media and media services in the initial course, it was decided to provide this function in the children's literature class also. Motor skill development, which some of the students had not previously encountered, was omitted since the media laboratory supervisor indicated willingness to assist students in setting up self-instructional programs if needed. Models of media use, recommended for inclusion in all courses, were to be viewed at appropriate points in the children's literature class.

System Synthesis

Development of a system model.--Using the functions identified for the children's literature course, a system model was conceptualized as shown in Figure 7.

Input for the system included students' entry behavior as previously described, funds provided by an instructional development program at the University for design and production of the self-instructional packages, and research results pertaining to learning, selection

FIGURE 7: PORTION OF SYSTEM TESTED IN
CHILDREN'S LITERATURE CLASSES



and use of media, and design of instructional systems. Knowledge to be conveyed and intellectual skills to be developed were derived from the competencies to be developed (e.g., knowledge of media types and their characteristics and skills in discovering implications for their use in specific instructional situations). Behavior of students after their exposure to the experiences provided by the system was to be described in quantitative terms as follows: the number of media used by demonstration groups in making their presentations, the media experiences reported by students after the course as compared with those reported before the course, and the number of ideas generated after use of the self-instructional programs. No attempt was to be made to establish causal relationships.

Selection of Strategies

In a previous section, it was proposed that research results support the ability of self-instructional programs to convey media information. It was further suggested that, should all students in a group need certain knowledge and should the professor be able to provide class time for this purpose, information might, at times, be more efficiently conveyed to all students simultaneously.

In the case of the children's literature class it was decided, because of the limited media background of students and the need for committees to start initial

planning of their demonstrations as early as possible, to convey needed content to the total group by means of a media unit. Careful scrutiny of the necessary media competencies enabled the professor and the present investigator to determine which might best be approached by means of group instruction, which by individualized instruction, and which by a combination of the two. The chief criterion used for making this decision was the degree to which a particular experience was required by all members of the groups versus its need by only some members.

The competencies suggested for development, the strategies chosen, and the reasons for choices are summarized in Figure 8.

Selection of media.--Three fifty-minute group sessions were planned to initiate development of the above competencies as follows:

Group session #1 was planned to introduce the competencies on media types and characteristics and on instructional situations requiring media. In order to present an overview of media types as efficiently as possible, a slide-tape presentation was prepared. Two instructional situations (not in the children's literature area) in which learning could be facilitated by media use were identified, and brief segments of available materials were shown and described.

FIGURE 8. REASON FOR SELECTION OF STRATEGIES.

Competency	Strategy	Reason
Media types	Group instruction	Overview of media types not given in initial course; needed by all students
Media characteristics	Group plus individualized instruction	Overview needed by all; characteristics of specific media needed by groups considering those media for their demonstrations
Situations requiring media	Group instruction	Introduction needed by all; ability to identify situations extended mainly by viewing and analyzing models of media use
Selection	Group plus individualized instruction	Introduction needed by all; help in matching characteristics of specific media to specific learning situations required by groups considering use of those media
Production	Individualized instruction	Information on production of specific media required only by committee deciding to use those media in demonstrations
Utilization	Group plus individualized instruction Group interaction	Use of media in an instructional unit needed by all; use of specific media needed by committees selecting those media; interaction required to extend students' ability to develop concepts, draw inferences, and apply generalizations about media use

Group session #2 was designed to introduce students to characteristics of media types and to assist them in drawing inferences as to the most useful media for achieving instructional objectives in the two previously-introduced teaching-learning situations. Check sheets were provided on which students identified those characteristics possessed by specific media types. Attempts were then made to identify with students the characteristics demanded by the two teaching-learning situations and to determine which of the available media types had those characteristics. For example, a motorized planetarium was selected as most appropriate for developing the concepts of rotation and revolution of the earth, these concepts requiring a media type which is both three-dimensional and capable of motion.

Group session #3 was planned to illustrate use of media in an instructional unit.⁴ Excerpts from various media (e.g., a motion picture, filmstrips, recordings, flat pictures, transparencies, and pupil-made materials) were used to illustrate utilization of media in introducing a unit and in helping students gather information, develop needed intellectual skills, build attitudes and appreciations, and summarize and share learning. For the first group, the demonstration was done with a pre-recorded tape commentary, and for the second group, commentary was furnished by the demonstrator. It is of interest that the second demonstration, although not as efficiently executed,

was more appropriate to the group in that it accommodated to student feedback.

Production of media.--Self-instructional programs were designed: (1) to help students extend their knowledge of the characteristics of various media types, (2) to provide opportunities for them to use instructional purposes and media characteristics in selecting appropriate materials for a teaching task, and (3) to help them explore effective ways of using media.

Nine such programs were developed and made available for use in the carrels in the Instructional Resources Center. They included: bulletin boards, dioramas, filmstrips, flannel boards, flat pictures, puppets, tape recordings, teacher and pupil-produced maps, and transparencies. In designing the programs an attempt was made not only to transmit information about selection, utilization, and (if appropriate) production of the media type, but also to provide experience in transfer (application of principles identified by the program) to the student's own instructional situation.

For purposes of conveying the desired information as effectively as possible, the program designed attempted to apply certain principles identified by Traverse (1964) in his publication Research and Theory Related to Audio-visual Information Transmission. These included: verbal simplification, lack of embellishment, simultaneous

presentation of redundant information in both the audio and visual channels, use of a variety of examples of a principle, and cessation of information flow while the learner performed a task.

For purposes of facilitating transfer of principles identified by the program to students' own situations Gagne's (1962) research had implications. Gagne's theory, that, if a hierarchy of competencies is identified for any task, acquisition of higher competencies is dependent on prior mastery of those lower in the hierarchy, has been from 97 to 100 per cent confirmed by various of his studies.

Although no research exists showing a hierarchy of competencies needed by students in applying principles of media selection and use to their own instructional problems, self-instructional programs used in this study were based on the assumption that development of this competency might proceed through the following steps:

1. helping the student recognize characteristics of a media type which make it useful for particular kinds of tasks,
2. helping the student recognize characteristics required by specific instructional situations,
3. providing students with examples in which media characteristics are matched with instructional situations requiring those characteristics,
4. giving the student an opportunity to identify further situations for which the characteristics of the media type make it appropriate.

Worksheets designed to accompany the programs were developed primarily for the purpose of testing the students' ability to apply the media type to situations other than those described in the program.

Try-out and Evaluation

The pilot study was evaluated in three ways: (1) by identifying the number of media types used by student committees in their demonstration of an aspect of children's literature, (2) by comparing students' reported media experiences at the beginning and end of the 1968 spring term, and (3) by studying students' ability to apply the media selection and utilization principles identified by the self-instructional programs to new situations.

In order to redesign the media packages to make them more effective, student evaluations of the programs were also carefully analyzed.

1. Media types used by students in children's literature demonstrations.--Early in the term students chose topics on which they wished to prepare demonstrations for the class. Demonstration groups averaged above five persons. Each group was asked to hand in on the day of its demonstration a planning sheet including the following information:

General objective of the demonstration

Specific objectives of the demonstration	Media selected	Characteristics of media selected
1.	1.	
2.	2.	
etc.	etc.	

Tabulation of information on the sheets revealed students using a variety of materials in their demonstrations, the following numbers of media types being used by various groups:

	Group 1	Group 2
Social studies	13 media types	9 media types
Science	8 media types	6 media types
Bibliotherapy	8 media types	10 media types
Creative writing	4 media types	5 media types
Poetry	6 media types	
Individualized reading	8 media types	

These figures indicate use of an average of eight audio-visual media types by each group during the course of a fifty-minute demonstration. This suggests that students had become aware of the utility of a variety of media for enhancing teaching of children's literature.

Media types used by the demonstration teams in order of frequency of use were: bulletin boards, records, flat pictures, objects or models, filmstrips, displays, charts,

posters, puppets, flannel boards, transparencies, maps, chalkboard, dramatization, slides, dioramas, motion pictures, resource people, tape recordings, and globes. It would appear that more easily procured and/or produced media were used more frequently than those not so easily procured or produced.

2. Media experiences reported at beginning and end of spring term.--At the beginning and end of the spring term students in the two children's literature classes were asked to check experiences they had had with twenty-five media types. A summary of the findings appears in Figure 9.

It is of interest that, although across all categories, students reported more media experiences at the end of the term than at the beginning, those in which most growth was reported were suggestions for use of media and suggestions for selection of media. All students reported having used an additional three types of media during the term.

It will be noted that, although post-student teaching people initially reported more experiences, they showed more growth from the beginning to the end of the term. This suggests the importance of actual classroom experience in helping prospective teachers recognize the implications of media for instruction.

FIGURE 9. MEDIA EXPERIENCES REPORTED BY AT LEAST HALF OF THE STUDENTS ENROLLED IN TWO CHILDREN'S LITERATURE CLASSES AT MICHIGAN STATE UNIVERSITY AT BEGINNING AND END OF SPRING TERM, 1968.

	Pre-Student Teaching Group		Post-Student Teaching Group	
	Beginning	End	Beginning	End
Number of media types seen used in class	15	15	16	20
Number of media types for which selection criteria had been given	0	3	3	11
Number of media types for which utilization suggestions had been given	0	10	5	17
Number of media types for which production suggestions had been given	0	1	1	3
Number of media types used in demonstrating something to pupils or to peers in a college class	0	3	6	9

Of the twenty media types that post-student teaching people reported having seen used in classes, nine were used by the student himself. It is of interest that, of these nine, all except one are commercially produced. Of the eleven seen but not personally used by students, six require production proficiency. The fact that students report little assistance with simple production processes at either pre- or post-student teaching level indicates a need for greater attention to this area.

Of eleven media types for which members of the post-student teaching group had been given both criteria for selection and suggestions for use, nine had been used by at least half of the group. This suggests that the extra confidence which students have when provided with pre-service training in selection and utilization of media encourages them to incorporate more materials in their own teaching.

3. Number of media selection and utilization principles applied to other situations.--It was hypothesized that the media programs would be useful to prospective teachers only if they enabled them to apply the suggested principles of selection and utilization to their own instructional problems. One portion of each program worksheet afforded the student an opportunity to do this. The worksheet on filmstrips, for example, asked students to select any two strips not

used in the program, choose a frame or frames in each, and list questions they would ask if utilizing it for one of the purposes indicated in the program. Several examples follow:

<u>Material Selected</u>	<u>Purpose</u>	<u>Suggested Questions</u>
Filmstrips on pioneer life	For helping pupils "read" pictures	What are they building the house of? What has been done to the logs? How are they held together?
	For helping pupils form concepts	Why was it important that the fire be kept going all the time?
	For drawing inferences	What factors limited the settlement to the seaboard for so long? Why did people finally move West? Why was it so hard to plow the land and plant a crop?

The worksheet on flat pictures asked students to select three or four pictures from a collection prepared for them, indicate for which purpose each would be used, and describe how it would be used to achieve the purpose.

Several responses follow:

<u>Material Selected</u>	<u>Purpose</u>	<u>Suggested Questions</u>
Picture of a redwood tree	For "reading" pictures and drawing inferences	Questions to help pupil determine size of tree
Pictures of the earth's surface	For developing concepts	Questions to help children develop concept of erosion

<u>Material Selected</u>	<u>Purpose</u>	<u>Suggested Questions</u>
Picture of a falls	For stimulating creative writing	Questions to help children think about the sound it makes, how the spray would feel
Picture of a sunset	For stimulating creative writing	Question about how a sunset would make one feel

The worksheet on flannel boards asked students to list other examples of layouts illustrative of types of uses suggested in the program. Several responses follow:

<u>Type of Use</u>	<u>Specific Examples of Use</u>
Depicting a process	An assembly line replication (e.g., for a car) with appropriate pieces being added at each step
Telling a story	A small group round robin, each child having a number of pieces to work into the story
Matching or grouping items that go together	States with major cities, industries, products, characteristics, animals, and plants placed in appropriate positions

The worksheet on the tape recorder asked students to list ideas for new uses of this device for purposes suggested by the program. Several ideas follow:

<u>Type of Use</u>	<u>Specific Examples of Use</u>
Motivation	Encouraging children to be creative by using the tape recorder to simulate radio programs, panel discussions, etc.
Drawing inferences	Recording sound effects and having pupils describe what they hear

<u>Type of Use</u>	<u>Specific Examples of Use</u>
Sharing information	Encouraging classrooms to share recordings of activities in which they are engaged
Evaluating pupil efforts	Recording pupils' speech and helping them evaluate it

While the above examples could hardly be adjudged as to quality or sophistication in media application or use, they are sufficient to demonstrate that the kinds of learning sought can be materially enhanced in a methods class and should be provided there.

4. Student evaluation of the self-instructional programs.--A survey of evaluation sheets turned in by students after use of the media packages reveals the information shown in Figure 10.

It appears logical that more programs were used by those students not having had teaching background or experience with a particular media type. Important in considering the degree of revision needed by the programs is the fact that an overwhelming majority of users judged the level as appropriate to their specific background and needs.

Because the purpose of the experiment was simply to determine the feasibility of this system of developing certain media competencies in a methods course and because of the many variables which would be encountered in such an effort, no attempt was made to determine whether amount or variety of use correlated highly with

FIGURE 10. STUDENTS' EVALUATION OF THE SELF-INSTRUCTIONAL PROGRAMS ON TYPES OF MEDIA.

Level of program users:

 Sophomore 43.5% Junior 56.5% Senior Graduate

Teaching experience of program users:

87% None 13% Student Teaching Regular Teaching

Previous experience with media type:

4.5% Much 4.5% Quite a Bit 13% Some

26% Hardly Any 52% None

Appropriateness of program in relation to background:

 Difficult 4.5% Somewhat Difficult 91% About Right

4.5% Rather Simple Simple

Of the programs used worksheets were turned in on twenty-three and amounts of use of programs on the various media types were as follows:

Bulletin boards	30.4%	(7)
Dioramas	21.7%	(5)
Filmstrips	13 %	(3)
Flat pictures	13 %	(3)
Tape recordings	8.7%	(2)
Flannel boards	4.4%	(1)
Puppets	4.4%	(1)
Teacher and pupil-produced maps	4.4%	(1)

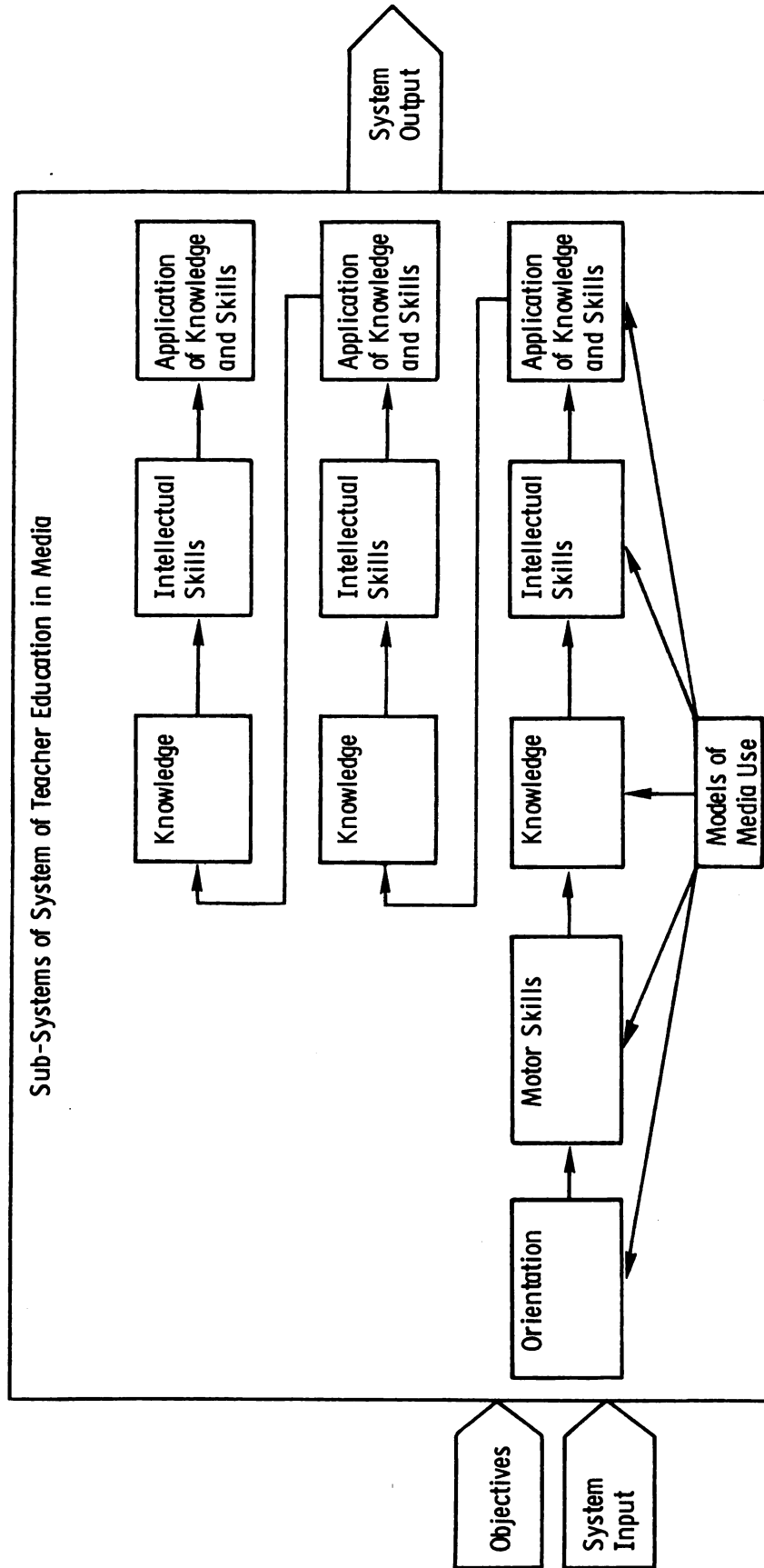
the quality of the student programs developed or with such factors as appropriateness of selected media types to children's literature or with availability or ease of production of materials chosen. Such considerations are obviously important, however, and would need to be accommodated in further refinements made in the system as a whole.

System Revision

Results of the pilot study of the system of teacher education in media reveal that, in general, steps identified for development of the system are appropriate. However, certain of the findings suggest a need for reconsideration of the system model (see Figure 11). The following changes in the model are recommended:

1. Greater emphasis should be placed on the psychological organization of the system.--Results of the pilot study indicated that members of the post-student teaching group responded differently to the system than those of the pre-student teaching group (i.e., they perceived implications of media experiences not seen by members of the pre-student teaching group). This suggests that the system failed to meet the specific needs of pre-student teachers as well as those of post-student teachers and that the psychological organization of the system should receive greater emphasis in any future investigation.

FIGURE 11: REDESIGNED MODEL OF SYSTEM OF TEACHER EDUCATION IN MEDIA*



*Feedback may and should occur at almost any point in the system. With this understanding, feedback lines have purposely been omitted from the above model to avoid visual confusion.

Conceptualization of a psychologically-organized system is complex, for while a logical system model is concerned primarily with the sequence in which functions are performed, a psychological one deals with the manner in which they are performed as they adjust to the needs of particular students or groups of students. It may, on occasion, reorder the logical pattern of system functions. Essential to the development of such a model is precise specification of system input in the form of student attitudes, perceptions, and behaviors. A system so organized must adjust to student variables not merely by varying the rate of movement through the system, but more importantly, by varying the type and quality of experience for different students.

It appears possible, in giving greater emphasis to the psychological organization of the system, to retain the previously-suggested functions but alter the manner in which they are performed.

Orientation.--After careful identification of input in the form of student experiences with and understandings about media, two or more concurrent orientation sessions should be scheduled, students participating in the one most appropriate to their previous experience with media and to their depth of understanding of the role of media in the teaching-learning process.

Motor Skills.--Availability or lack of availability of needed motor skills could be easily assessed, a student then being encouraged to enter each media projection and production skill development program at a point consistent with his degree of expertise in that specific skill.

Knowledge.--Self-instructional programs on media selection and utilization could also be prepared in modular form, students again being able to enter at points consistent with their experience and needs. To insure adequate program use and to avoid duplication, programs would be developed to provide experiences pertinent to specific courses and would be reserved for use in those courses. Although students would be expected to use at least one self-instructional program in each course, choice of programs would be made by the student on the basis of his learning purposes in relation to the course and to responsibilities that he might have in school classrooms.

2. The system functions of assisting students in gaining pertinent knowledge about media, in developing intellectual skills, and in applying knowledge and skills to instructional situations should be performed recurrently in a cyclical fashion.--The ability of members of the post-student teaching group to recognize implications of media experiences not seen by the pre-student teaching group

suggests that prospective teachers need experience in classrooms much earlier in the professional sequence. More opportunities for participation, tutoring, and micro-teaching seem to be necessary. It is obvious that opportunities for students to be involved in these types of experiences throughout the professional sequence generate recurring needs: (1) to know about media, (2) to consider the implications of media for the task at hand, and (3) to apply appropriate media knowledge and skills to instructional problems. Evaluation by students of their success in achieving their stated objectives in these situations provides feedback into the system. Subsequent teaching-learning problems (each increasingly complex) encourage the student not only to make use of feedback from previous problem-solving experiences but to seek more advanced knowledge, develop more sophisticated intellectual skills (e.g., concepts, generalizations, and inferences regarding media use), and make more competent applications of available knowledge and skills to the problem situation.

Learning to use media in the solution of meaningful teaching-learning problems, then, is a developmental process, the system functions being performed recurrently at increasingly sophisticated levels. Functioning in this manner, the system provides experiences in selection and utilization of media similar to those which in-service

teachers encounter in their own classrooms and provides a firm base for the teacher's continued growth in expertise in use of media after graduation.

As a result of the pilot study, the following changes in system operation are suggested:

1. Objectives need to be defined in such a way as to facilitate evaluation of quality as well as quantity of system output.--The present study was concerned with quantitative analysis of results--the number of media types used in demonstrations, number of media experiences reported by students before and after the study, and number of ideas generated after program use.

Quality of use, so essential to effective teaching, must be more carefully considered in future investigations of the systems approach to media competency development. Obviously specification of objectives for use in assessing quality is difficult as it requires answering the question "What is good?" To date, empirical studies in the media field have given little help in understanding what good selection and utilization practices are. Much additional research needs to be done in this area. In the meantime, it appears helpful for system planners to draw inferences about good media utilization from what is known about good teaching and learning.

2. In order to free professors for those roles which are distinctively human, knowledge about media should be made available to students to the greatest extent possible by means of self-instructional programs.--Following use of the self-instructional programs in the pilot study, responses of students indicated that they not only had gained knowledge about media but had demonstrated the ability to generate new ideas based on the knowledge. Numerous previous studies have demonstrated the capability of media of conveying information as adequately as teachers can. It seems important, then, that in a man-machine instructional system, the talents of humans be reserved for those important functions which only they can perform (e.g., the kind of interaction between professor and students which occurred in the children's literature classes). This crucial point will be explored more completely in Chapter V.

3. Greater attention should be given to production of simple instructional materials.--Since major emphasis in this study was placed on selection and utilization of media, few production experiences were reported by students at its conclusion. More than half of the media types which they had seen used by professors but had not personally utilized were ones requiring some expertise in production. It is suggested, therefore, that, because teaching and learning are often greatly enhanced by the

media that teachers and children make for themselves, a laboratory of the type proposed by Combs be a part of any future investigation of a teacher education in media system. Such a laboratory would enable prospective teachers needing materials for specific teaching-learning situations to investigate the use of available commercially-produced media, make supplementary teacher-produced ones as required, and test the validity of proposed utilization procedures both in simulated instructional situations in the laboratory and in first-hand situations in a classroom.

In addition to the extended study of the system and the changes recommended here, other recommendations need to be made with respect to faculty time, instructional development personnel, and supportive facilities and services. These will be discussed in the following chapter which will present the findings and conclusions of this study.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY OF THE INSTRUCTIONAL SYSTEMS APPROACH TO DEVELOPMENT OF MEDIA COMPETENCIES

A need for prospective teachers to develop media competencies has been indicated both by school administrators and supervisors as well as by the findings of empirical studies. Considerable evidence exists that teacher education institutions are currently unable to provide a basic media course for all prospective teachers, and that alternative methods of developing competencies in selection, production, and utilization of media need to be investigated.

The purpose of the present study has been to explore the feasibility of a systems approach to teacher education in media with desired competencies being developed in existing elementary undergraduate education and methods courses. A review of the literature has disclosed suggested media competencies, advantages and limitations of various methods of competency development, and proposed steps for designing an instructional system. A pilot

study to test procedures suggested for development of a system of teacher education in media has been designed, conducted, and analyzed.

Six questions were raised in this investigation. These questions, the manner in which they were investigated, and the subsequent findings are as follows:

Question 1: What competencies in selection, production, and utilization of media should be initially developed at pre-service level?

This question was investigated through use of three procedures, namely, ascertaining common elements in previously developed media competency lists, performing a task analysis of the terminal behavior expected of teachers in the area of media utilization, and submitting the resulting group of competencies to teacher education specialists on the Instructional Media Center staff for further validation. The competencies recommended for initial development at the pre-service level are listed under question two below.

Question 2: What do selected professors of undergraduate elementary education and methods courses at Michigan State University consider to be the optimum point or points in the elementary course sequence for initial development of each of the suggested media competencies?

This question, and the next two, were answered by interviewing representative professors of the following courses in the elementary education sequence at Michigan State University: Individual and the School (the initial

required education course); Curriculum Methods and Materials (the general elementary methods course), and courses in the teaching of mathematics, science, reading, and social studies. The director of the student teaching program was also interviewed. Recommendations of these seven professors regarding optimum points for initial development of the proposed competencies are:

	<u>Competency</u>	<u>Suggested Point for Development</u>
Competency 1:	Recognizing the various types of media and their characteristics	Initial education course, methods courses
Competency 2:	Recognizing instructional situations in which learner achievement can be facilitated by appropriate use of media	Methods courses
Competency 3:	Designing clear and specific instructional objectives for teaching-learning situations	Methods courses, student teaching
Competency 4:	Selecting media appropriate to specific teaching-learning situations in terms of subject and learner needs and the characteristics of the media type	Methods courses
Competency 5:	Locating sources of media appropriate to specific teaching-learning situations	Methods courses
Competency 6:	Producing simple media not commercially available	Methods courses
Competency 7:	Utilizing media in terms of sound principles of learning and of instructional objectives sought	Methods courses, student teaching

	<u>Competency</u>	<u>Suggested Point for Development</u>
Competency 8:	Utilizing appropriate combinations of media in a systems approach to instruction	Student teaching
Competency 9:	Evaluating and modifying one's use of media in terms of achievement of instructional objectives	Student teaching

Question 3: Do the recommended competencies tend to fall in such a way as to suggest a logical sequence within existing courses?

It will be noted that the participating professors proposed initial development of competency one (1) in the first required education course and in methods courses, competencies two (2) through seven (7) in methods courses, and competency three (3) and competencies seven (7) through nine (9) during student teaching. If these judgments were applied, the needed competencies would fall into a logical sequence within existing courses.

Question 4: To what degree do selected professors of undergraduate elementary education and methods courses perceive these competencies as being currently developed by prospective elementary teachers at Michigan State University?

In responding to question four, each professor was asked to indicate his perception of the degree to which students entering his class had developed each of the nine media competencies. Professors' replies follow:

Number of the Nine Competen- cies Judged As	When Students Enter the Ini- tial Required Education Course	When Students Enter Methods Courses	When Students Enter Student Teaching
Well developed	0	0	1
Somewhat developed	1	0	3
May or may not be developed	1	2	1
Probably not developed	1	4	3
Definitely not developed	6	3	1

Question 5: Can suggested steps for system development, as derived from the literature, be used to identify a procedure for the design and operation of a system of teacher education in media?

Question five (5) was answered by using system development procedures derived from the literature to design a system of teacher education in media. The procedures utilized were: goal identification, system analysis, system synthesis, try-out and evaluation, and system revision.

In conjunction with goal identification, the following steps were employed: specification of desired outcomes of the system under consideration; description of the present situation, including the degree to which

specified goals are being achieved; and analysis of the problem, including reasons for any current inadequacies in goal achievement.

System analysis was undertaken by means of examination and choice among alternative solutions to the problem, specification of proposed functions of a system of teacher education in media, and identification of sub-systems based on functions.

System synthesis was achieved by developing a proposed model for a system of teacher education in media. Conceptualization of the system was approached by analysis of relationships among sub-systems, identification of relationships between sub-systems and courses, selection of suggested instructional strategies, and consideration of appropriate media types.

Procedures utilized for try-out and evaluation and for system revision will be discussed under question six (6).

Question 6: If a pilot study is conducted with one course, what implications are there for redesign of the total system?

Question six (6) was explored by conducting a pilot study in two sections of Dr. Jean LePere's children's literature class during spring term, 1968. One of the professor's objectives necessitated development of media competencies by students. This was the objective that students become well acquainted with a special area of

children's literature and share their findings with others by means of a class presentation involving various media types.

Use of the systems concept in planning the pilot study required concurrent consideration of several factors and their interrelationships. Professors interviewed by this investigator had recommended that, of those media competencies identified for development at the pre-service level, one (1) through seven (7) be developed in whole or in part during the methods block. The model of the proposed system of teacher education in media suggested that two functions, namely, conveying basic content and developing basic intellectual skills in the media area be performed in conjunction with methods courses. It further suggested that self-instruction and class interaction strategies be used to perform the functions.

Experiences planned for the pilot study consisted of three demonstrations by the investigator for the total group and nine self-instructional programs made available to individuals. Following those learning experiences, student committees presented selected lessons in children's literature, utilizing and discussing a variety of media applications as they did so.

An analysis of student achievement at the end of the pilot study indicated the following:

1. Demonstration groups utilized an average of eight different media types in their presentations.
2. Students completing worksheets after use of a self-instructional program generated an average of five ideas regarding other ways of utilizing the media type discussed in the program.
3. Of particular significance is the fact that a majority of students reported substantial growth in the number of experiences received in media selection and use during the term. More than half of the pre-student teaching group, for example, reported

having been given criteria for selection of three more media types

having been given suggestions for use of ten more media types.

A majority of the post-student teaching group reported

having been given criteria for selecting eleven more media types

having been given suggestions for using twelve more media types.

After student demonstrations for the class, a majority of the members of both pre-student teaching and post-student teaching groups reported having used three more media types with pupils or peers.

Evaluation of results of the pilot study suggests that the system should be redesigned in the following ways:

1. By placing greater emphasis on the psychological organization of the system and by more adequately responding to the special needs of members of the pre-student teaching group.
2. By using a developmental approach to performance of the system functions of knowledge, intellectual skills, and application of knowledge and skills, all of these being based on the students' sense of a need to know.
3. By seeking to specify objectives conducive to the measurement of quality as well as quantity of system output.
4. By freeing the teacher to perform "human" functions as a result of allocating to media a more substantial role in making information available to students.
5. By placing more emphasis on development of competency in production of teacher-made materials.

Implications of This Study

Several implications of this study are apparent. These are categorized in three groups: implications for teacher education, implications for teacher education in media, and implications for instructional system development.

Implications for Teacher Education

1. If prospective teachers are to find their methods courses as meaningful as possible, they must have classroom experience earlier in the professional sequence.--Whether early involvement in classrooms should be extensive, should be available in limited form and supplemented by video-taped or filmed classroom episodes, or should be available in a series of experiences which increase in length and sophistication, this study cannot say. The point, however, is clear: learning occurs only as knowledge comes to have personal meaning for students. It appears, from this study, that classroom involvement is one of the most important factors in enabling prospective teachers to attach meaning to teaching-learning problems, including those pertaining to selection and utilization of media.

Implications for Teacher Education in Media

1. Purposes for which students use media during teacher education must be ones that they perceive as real

and important (e.g., ones that are derived from a need to teach something to a student or group of students or from a class assignment which involves demonstrating for one's peers).

2. Watching someone else demonstrate with media can contribute substantially to the prospective teacher's competencies in media selection and utilization if followed by thoughtful discussion of implications of the demonstration.--In the pilot study, discussion of selection and utilization of a media type was more conducive to its use than merely watching a demonstration. This suggests that only as prospective teachers become involved does a media demonstration begin to have personal meaning for them. Involvement may be in the form of participation (as when a professor is using media to achieve specific instructional purposes in a class) or it may occur as free and frank discussion of the selection and utilization techniques utilized by a professor or public school teacher in a particular teaching-learning situation. Adequately handled, such involvement enables prospective teachers to begin to form generalizations about effective ways of using media.

3. Appropriate media selection and utilization techniques can be aided substantially by experiencing media selection and utilization. A representative collection of materials should be readily available for

use by prospective teachers during the pre-service period.--

Such a collection should include not only an adequate supply of commercially-produced materials (e.g., 8 and 16 mm films, filmstrips, records, tape recordings, pictures, transparencies, models, videotapes, and programmed materials) but supplies and equipment for use in making one's own materials.

This implies a need for the kind of laboratory described by Combs, one in which students have many opportunities to experiment with materials, make materials, do demonstrations and watch others demonstrate, and critically assess the usefulness of materials and techniques. Responding to simulated situations involving media selection and use and interacting with others about the simulated experience should be one of the kinds of opportunities available to prospective teachers in the laboratory.

4. Students should be actively involved in use of media in classrooms if they are to recognize the implications of media for teaching-learning situations.--Prospective teachers should have an abundance of opportunities to use materials with children for a wide variety of purposes. Such opportunities can be readily found in participation experiences, tutoring, and micro-teaching as well as in student teaching.

Implications Regarding Instructional Systems

1. System development procedures are useful tools for helping a group achieve its goals more effectively.--

Though a system is neither inherently good nor bad, it can be utilized to facilitate achievement of either good or bad purposes. The awesome responsibility is to make sure that the men who design the system have worthy group goals.

2. System development procedures, properly used, facilitate change.--Change is a necessary concomitant of our world today. Moreover, it occurs with such rapidity that man frequently experiences what Shane calls "the dizzying disorientation brought on by the premature arrival of the future" (p. 67). It is apparent that unless individuals and organizations can also change, civilization cannot survive. Gardner clearly expresses the challenge when he says in his provocative book, Self-Renewal: "In the ever-renewing society what matures is a system or framework within which continuous innovation, renewal, and rebirth can occur" (p. 5).

Instructional systems appear to provide educational institutions with the capability of continuous renewal. They do so by providing an orderly process for planning how to achieve specified goals, for implementing the plans, for evaluating their effectiveness in terms of goal achievement, and for revising the system, when

necessary, and in a manner designed to facilitate more complete goal achievement.

3. Systems may inspire the creative functioning of individuals.--A system tends to set broad limits within which individuals can operate. A system such as the human body, for example, functions properly only when the individual is mindful of certain limits (e.g., the need for a balanced diet, appropriate combinations of work and relaxation, exercise). Within these broad limits, however, there is room for individual variation. A balanced diet does not need to be the same for everyone, but can vary to meet individual tastes.

An instructional system also sets broad limits for the individual. In this investigation, broad general goals were established for the pilot study. Within these goals, however, the individual professor was able to function effectively, establishing objectives that were seen of vital importance. The students, in turn, functioning within the broad goals of the system and the somewhat more specific goals of the course, were also able to identify purposes that were meaningful to them and to achieve their purposes in creative ways.

4. Systems can free the individual to become more creative by assigning to media the functions that they can perform as effectively as humans and to teachers the roles that only they--because of their humanness--can play.--The ultimate objective of a system of teacher

education in media is that teachers and pupils use media in the ways most conducive to achievement of their teaching-learning objectives. Use of media is an aspect, then, of creative teaching.

It has been demonstrated that creativity does not exist in a vacuum but grows rather out of a rich storehouse of information. It is also true, however, that possession of knowledge is a necessary but not sufficient condition for stimulation of creativity. As a person begins to use knowledge, to identify its meaning for him, and to put it together in new ways, creativity occurs.

This implies that, in order to stimulate creative teaching, a system must perform two interacting functions. Not only must it help students to gain the knowledge to be used as a basis for creative thinking and action, but it must also help them learn to think with the knowledge, to see what it means, to combine it in new ways, and to use it in problem-solving situations. In the past, teachers have most often concentrated their efforts on the first function. Recently, however, research has shown that this function can be performed as adequately by media without a teacher. The challenge is clear: teachers must now identify much more carefully and become much more competent in the second function, the one which only they --because of their humanness--can perform.

This study helps in differentiation of the types of functions which media and people can best perform. In the children's literature course, presentation of information was accomplished adequately by self-instructional programs, freeing the professor for another kind of role. This consisted of the following types of activities:

Developing course goals.

Formulating general plans for a situation that would provide students with "real" purposes for learning to select and use media.

Introducing committee members to the general nature of the task and giving them opportunities to interact and plan.

Interacting with committees as general and specific guidance were needed.

Helping students become aware of resources available to them.

Assisting students before their demonstrations by asking questions and making comments designed to help them (1) analyze the instructional problem they were attempting to solve, (2) relate appropriate knowledge to it, and (3) plan appropriate procedures for solving it.

Assisting students after the demonstration by helping them evaluate it and discover its implications for the classroom.

Interacting with students more extensively in areas that would not have been possible outside the system (e.g., spending more time with students in sharing, analyzing, and enjoying books).

This study implies that, if a systems approach is to be used, the appropriate role for media is primarily one of making information available to prospective teachers and helping them begin to generate new ideas from it. The

appropriate role for the teacher is that of stimulating, providing a setting in which students can attack real problems, making materials and resources available as needed, guiding, supporting, questioning students in order to challenge and clarify their thinking, providing opportunities for interaction which facilitates discovery, and helping students evaluate their efforts.

Although this study has focused primarily on the cognitive aspects of the development of media competencies, both this and other studies point to the fact that an individual should, in the final analysis, be dealt with as a unit. His knowledge, his perceptions, his attitudes cannot be put into separate containers and viewed as discrete elements. He, too, operates as a system, and, as was shown by this study, the information he has received cannot be viewed apart from the experiences he has had and the influence they have on how he perceives.

This need for relating to the prospective teacher as a unit also helps in differentiating the role of the teacher in an instructional system. He must have as great an awareness as possible of these interrelated components of the students with whom he is working, for only as he understands and responds to them, can he begin to meet students' unique needs. Media and machines can respond to the unique cognitive needs of pupils, but not to the

complex interrelationships of cognitions, perceptions, and attitudes. This only a human being can do.

Educational Change

Although the findings of this study lead to cautious optimism regarding the feasibility of a system of teacher education in media, certain environmental factors must be adequately understood and carefully taken into account if such a system is to be successful. Schuller, in a paper on systems development presented at a recent conference at Bucknell University, strongly emphasized the point that a system must be able to survive in the "real world" in which it comes into existence. Since the instructional systems concept is relatively new to many teacher educators, any attempt to introduce such a system must take into account the findings of pertinent research on the change process. It seems appropriate, therefore, in considering further work on a system of teacher education in media, to review certain pertinent principles abstracted from the literature on educational innovation and relate them to possible system development procedures.

Role of the Administrator in Educational Change

Whether or not change in education occurs "from the top down" as the Brickell study suggests, it is certain that the administrator plays a crucial role in determining

whether change occurs. It is he who sets the climate of his organization. If he is a person who values change; if he establishes a climate conducive to exploration, experiencing, seeking new answers to problems; if he minimizes the threat that teachers tend to feel when they try new procedures and techniques; if he is supportive of innovative efforts, change is much more likely to occur. This kind of support was available during the pilot study and would be important to further investigation of the systems approach to development of media competencies.

Role of Innovative Teachers in Educational Change

Wiles proposes that, in every organization, there are innovative and influential persons with whom change agents can most profitably work, letting innovation spread from them. The professor under whose guidance this pilot study was conducted is such a person and is representative of the type of professors who should be sought for further work in this area.

Establishment of Temporary System During Design of Innovation

It has been recommended that, when innovative procedures are being explored, a temporary system be set up, this system to provide an enriched, protected, autonomous

environment. Use of one course for the pilot study, with a time limit of one term, did, in fact, provide a temporary system for investigation of the questions posed. Enrichment did occur as a result of the services of the investigator and the funds made available through an instructional development project for design and production of the self-instructional packages.

Linkage Between Temporary and Permanent Systems

Obviously, innovative procedures can be designed but not fully implemented in a temporary system. To facilitate implementation, adequate linkage between temporary and permanent systems is required. Attempts have been initiated, and should be continued, to contribute to the awareness of other staff members of the findings of this study.

Role of Respected Co-Workers During Evaluation of Innovation

Following design of an innovation, Lionberger suggests, change tends to proceed through five stages: interest, awareness, evaluation, trial, and acceptance. Various studies indicate that, while innovators and change agents are very active during the first two stages, an individual's reference group and his respected co-workers are most influential during evaluation of an

innovation. The professors interviewed in regard to media competencies appear to be appropriate persons to assist with dissemination of findings of this study and with evaluation of the potential of a system of teacher education in media.

Relation of Characteristics of
An Innovation to Its Successful
Introduction

In the summary chapter of his volume, Innovation in Education, Miles lists several characteristics which tend to encourage adoption and acceptance of an innovation.

These include, among others:

1. Support of values prized by the adopting group.
2. Congruence with the accepting system (relative absence of threat to existing practice or to autonomy of people).
3. Likelihood of reducing a gap between ideals and practice.

In the case of this pilot study, the investigator attempted to furnish materials and experiences supportive of a course objective previously identified by the professor, this objective also being related to the media competencies recommended for initial development in methods courses.

Professors interviewed in the study expressed concern that students receive experiences conducive to development of appropriate media competencies, and were in substantial agreement that such competencies were not in fact being developed. A plan for more effective provision of

such experiences should, therefore, meet with their acceptance unless other factors interfere.

One such factor could be that a proposed new system might pose a threat either to their existing practices or to their enjoyment of relative autonomy. Because a system of teacher education in media, improperly introduced, might appear to have either or both of these disadvantages, it should be made clear at the outset that the proposed system would be designed in collaboration with professors of education and methods courses, and that any self-instructional media programs would be supportive of their course objectives, relating them, as feasible, to the identified media competencies.

Adequate Support of Adopters During Trial Stage

Lionberger and Miles, among others, have emphasized the fact that adequate support is a crucial factor during the implementation stage of an innovation. Since this study proposes the incorporation of media content in existing courses, it is important that professors be provided assistance in the addition of such content. This suggests that further investigation of a system of teacher education in media would require the services of an additional media professional in the College of Education to coordinate development of the self-instructional programs required for making available the proposed media

content. Such a person is needed to assume major responsibility for program development after consultation with the professors involved, and to facilitate students' exploration of the potential of media in instruction. Experience in the present study further suggests that adequate funds be made available for development of the required self-instructional programs, and that released time be given a faculty member during any term in which he is engaged in planning for the production of self-instructional programs. Such a pattern is commonly provided under grants from the Educational Development Program of Michigan State University.

Proposed System Development Procedures

The system development procedures derived from the literature and applied to the problem of development of media competencies in one course will now be used to suggest steps for investigating a system of teacher education in media in a college of education. Implications of the previously-identified change principles will be incorporated in the discussion.

Administrative Action

Although interest in developing a system of teacher education in media may initially be expressed by a faculty group such as a committee charged with the responsibility of planning an innovative teacher education program,

implementation of such a system should be initiated by administrative action of the college of education and the media department.

A committee composed of innovative staff members knowledgeable in the media area should be authorized to make plans for system implementation. The selection of appropriate members for this committee cannot be over-emphasized. Ideally, they should be faculty members with a deep concern about how people learn, about how media contribute to learning, and about appropriate ways of helping prospective teachers develop the needed competencies in selection and utilization of media. Previous experience in instructional development would also be helpful.

Committee members should include the director of the college of education resources center; a media instructional development person; and a representative of each course or group of courses to be involved in the system. The director of the resources center would be expected to initiate planning among committee members, call the committee together as necessary, and maintain effective communication among members during the period of the group's existence.

Planning Committee Action-- Stage One

The planning committee as a group should be responsible for certain aspects of goal identification, system

analysis, system synthesis, and system redesign. These will be discussed individually.

1. Goal identification.--As has been stated previously, a system can assist a group in achieving its goals more effectively, and this applies regardless of the goodness or badness of the goals. It would seem important that the proposed system planning committee formulate two sets of goals, one to guide its development of a system consistent with the basic values held by its members and another to specify desired system output. Goals to be used in system development should be stated first and should indicate kinds of values to be built into the system. General goals specifying system output should be derived from the media competencies and attitudes a faculty desires for its prospective teachers. Quality as well as quantity of output should be a concern of the planning committee.

2. System analysis.--A potential teacher education in media system starts with a diverse group of courses, professors, students, media, and machines and seeks to create from this diversity a functioning unit. Some organizing entity must be employed for this purpose. Various system designers have suggested that analyzing the functions to be performed by the proposed system is an appropriate procedure.

The second responsibility of the planning committee, then, is to identify desirable system functions. The goals previously formulated to guide system development should be useful at this point, for identified functions should be consistent with the philosophy of education and the point of view toward students and learning expressed in these goals.

Another aspect of system analysis and a third responsibility of the planning committee is identification of sub-systems. Traditionally courses have tended to be viewed as sub-systems of a teacher education system. In order to allow for more flexibility in system design, this investigation has adopted Trzebiatowski's suggestion that sub-systems be based on functions, this procedure enabling one, when necessary, to disregard course boundaries in favor of other organizational patterns (e.g., the function, application of media knowledge and skills, can occur in tutoring, micro-teaching, or student teaching, which are not limited to any one course).

3. System synthesis.--Once sub-systems have been identified, the committee should begin to conceptualize the system in the form of a working model. Such a model should provide, in visual form, the hypothesized relationships among the sub-systems as well as relationship of input and output to the system as a whole.

Accurate identification of input, which Trzebowski suggests is often inadequately accomplished, is crucial to successful system operation. The planning committee, therefore, should be responsible for identifying funds available for system implementation, available resources (e.g., facilities, materials, equipment, and staff) and, in a general way, student competencies and attitudes in the media area.

After the system is conceptualized, planning committee members should appraise it critically to determine whether it does, in fact, implement their previously-identified goals for system development. It is appropriate to ask, at this point, if the model depicts a system that can (1) adapt to the needs of students with varying backgrounds, attitudes, and perceptions in relation to media; (2) allow its human components, both teachers and students, to function in a creative fashion; (3) utilize the unique capabilities of both teachers and media; (4) facilitate communication and cooperation among its components; and (5) facilitate analysis of when and how it needs to change.

The previously-identified steps in system design are basic to a system of teacher education in media. Prior to full-scale investigation, a pilot study should be employed, involving as members of a system try-out committee one professor from each of the courses or

experiences expected to be a part of the system. At Michigan State University, for example, the committee would include an instructor of the initial required education course, of a methods course, and of a student teaching group.

Again, selection of professors to participate on the try-out committee is crucial to system success. Selection of these persons should be from among the most interested, knowledgeable, and innovative members of the staff.

Try-out and Evaluation

Working together, members of the planning and try-out committees would agree on functions and goals to be assigned to each course.

An early responsibility of the try-out committee would be to attempt to obtain much more specific data about students' past experiences with, competencies in, perceptions about, and attitudes toward media at each of the three levels. Working with the media instructional development person, each professor should, within the broad spectrum of general goals set by the planning committee for his course or group of courses, identify his own specific goals. Further joint efforts of the professor and ID person would involve attempting to define the relationship between the professor's goals and the media objectives assigned to the course. Having

identified these relationships, appropriate strategies (large group, small group, or individualized instruction) should be identified and the content of self-instructional programs planned. Listing of behavioral objectives for the media aspects of the course would facilitate evaluation of the degree to which objectives had been achieved at the end of the course. Should it be required, the professor and media instructional development person would seek guidance from an evaluation specialist in determining appropriate means of evaluating goal achievement.

After careful planning by the professor and instructional development person, preparation of the self-instructional programs should be primarily the responsibility of the latter. Since programs are useful only when made an integral part of a course, it should be the responsibility of the professor to organize his course requirements so as to implement the joint plans made by him and the media instructional development person. A crucial point to be kept in mind by both of them, however, is that, within the general framework of system goals and those of the individual professor, students should be given opportunities to identify and pursue learning purposes important to them.

Recommendations and System Revision

Adequate evaluation of system try-out would be essential to further system development. Evaluation for purposes of system revision might be accomplished in one or more ways (i.e., by means of motor skill tests, knowledge items incorporated in regular course examinations; or evaluations of use of media in demonstrations, simulated experiences, micro-teaching, or student teaching).

Important as are the findings of this kind of evaluative effort, teachers' and students' perceptions of (and resulting attitude toward) the system will be strongly influenced by the degree to which it helps them accomplish purposes important to them. To the degree that it has done so, it will be more likely to be accepted.

The planning committee should serve still another important function by communicating results of system try-out to other staff members of the college of education on a regular basis by a variety of appropriate methods. Enthusiastic users of the system, both members of the try-out committee and students, are among the most appropriate people to assist in communicating the results of system use.

Careful analysis of results of system try-out should enable the planning committee to recommend adoption of the system as initially tried out or (which is more likely) as adapted following evaluation. Analysis should include

not only consideration of the degree to which students developed the desired competencies but of system performance in relation to the goals identified to guide its development and the questions asked about the capabilities of the system model.

One of the major advantages of the systems approach to instruction is its capability of adjusting its procedures to facilitate a higher degree of goal attainment.

Planning Committee Action-- Stage Two

During the second stage of investigation of a system of teacher education in media, the planning committee would be expected to make the following adjustments in the system:

1. Revising competencies and goals in terms of changes in the educational milieu,
2. Revising functions, sub-systems, and/or the system model in terms of inadequacies discovered in the system. Hypothesized relationships among system elements should be carefully examined at this time.

Implementation Committee Action--Stage Two

Following system revision additional courses should be involved in the system. Hopefully, professors of any one course would meet with the instructional development

person and come to joint agreements regarding relationships of their course goals to media goals and the kinds of self-instructional programs most likely to facilitate achievement of these objectives.

As more courses were built into the system, it would be the responsibility of the instructional development person to inform new participants of the ways in which their proposed activities related to those of other courses and to the total instructional system. It would also be the responsibility of this person to assist staff members in avoiding duplication of effort as well as failure to provide certain needed experiences.

Since instructional development is a time-consuming procedure, it is assumed that a period of at least three years would be required to involve all courses in the system.

System evaluation and necessary revision should occur at the end of each year. After an adequate trial period (perhaps five years) the staff should be given the option of continuing or discontinuing use of the system.

Summary and Conclusions

This study investigated the feasibility of designing a system for developing media selection and utilization competencies in existing education and methods

FIGURE 12. PROPOSED PROCEDURES FOR INVESTIGATION OF A SYSTEM OF TEACHER EDUCATION IN MEDIA.

Administrative Action	Planning Committee Action			Try-Out Committee Action	Planning Committee Action
	Goal Identification	System Analysis	System Synthesis		
STAGE 1	Decision to investigate systems approach	Identification of system functions	Development of system model, including:	Try-Out and Evaluation	Recommendations and Revision
	Identification of general goals based on:	Identification of sub-systems based on functions	general input relationships among system elements	Identification of: specific inputs specific goals strategies program content plans for evaluation	Study of try-out and evaluation Communication with staff
	Authorization of planning committee	competencies attitudes	Assignment of goals and functions to courses	Implementation Evaluation	Recommendation to adopt or revise system
			Authorization of try-out committee		Recommendations for redesign of system (see Stage 2)
↓					
STAGE 2	Decision to adopt or revise systems approach to development of media competencies	Revision of goals as per changes in educational milieu	Revision of functions as per try-out and evaluation	Revision of model as per try-out and evaluation	Study of evaluation efforts
		Revision of sub-systems as per try-out and evaluation	Revision of implementation committees for three levels	Identification of common goals, strategies, programs	Recommendations for redesign of system (at end of year)
				Identification of specific goals, strategies, programs	Recommendation to continue or discontinue systems approach (after three years)
				Implementation Evaluation	

courses by: (1) identifying nine desirable competencies for initial development at the pre-service level, (2) procuring the judgments of representative elementary education professors at Michigan State University regarding optimum points in the elementary course sequence for initial development of each competency, (3) deriving system design procedures from the literature, and (4) testing on a pilot basis in one course the system procedures for developing media selection and utilization competencies.

The conclusions are:

1. That findings of student and faculty surveys to ascertain the degree of media competency development of prospective elementary teachers at Michigan State University demonstrate a substantial need for improving current methods of developing these competencies.
2. That the substantial agreement of professors interviewed regarding appropriate points in the elementary education sequence for introduction of specified media competencies indicates the desirability and feasibility of a systematic approach to media competency development.
3. That professors' recommendations regarding points at which specific media competencies should be introduced suggest a logical sequence

of competency development in existing elementary education and methods courses.

4. That steps for system design derived from the literature and applied to planning for competency development in one course are practical and helpful.
5. That, following use of such procedures, students reported significantly more media experiences than they had at the beginning of the course.
6. That members of the post-student teaching group reported more media experiences at the beginning of the course and greater growth in media experiences during the course than those who had not participated in student teaching.
7. That students using self-instructional programs on media selection and utilization were able to suggest applications in other situations of the principles developed in the programs.
8. That the system, as initially tested, should be redesigned to place greater emphasis on psychological organization.

Recommendations

The recommendations of this study are based on three assumptions: (1) that prospective teachers need to acquire certain basic media competencies, (2) that a media course

is not the complete answer for the development of these competencies, and (3) that alternative answers to the problem need to be tried.

As a result of the findings of this study and the review of pertinent literature, the following recommendations are made:

1. That media professionals and teacher education faculties collaborate in identifying media competencies and attitudes which they want prospective teachers to acquire.
2. That a systematic approach to development of these competencies within existing education and methods courses be planned.
3. That such an approach take into consideration the background and needs of individual prospective teachers and relate media competency development to purposes which are important to faculty and to students.
4. That such an approach identify and take advantage of the instructional roles which can best be played by faculty members and by multi-media self-instructional programs.
5. That planners consider the following steps in developing the proposed system of teacher education in media:

- a. Goal identification (i.e., deriving system objectives from the identified media competencies).
 - b. System analysis (i.e., specifying functions to be performed by the proposed system).
 - c. System synthesis (i.e., incorporating these functions into a system model).
 - d. System try-out and evaluation (i.e., testing the proposed model).
 - e. System redesign (i.e., redesigning the model as necessary for more adequate goal achievement).
6. That, in order to facilitate acceptance of the system, planners take the following into account:
- a. The kind of climate that encourages change.
 - b. The role of administrators, innovative staff members, and "respected others" in change.
 - c. The role of adequate support staff, materials, and facilities in change.
7. That system planners evaluate the system by determining whether it does the following:
- a. Achieves identified goals.
 - b. Adapts to needs of students with varying backgrounds, attitudes, and perceptions in relation to media.

- c. Allows both teachers and students to function in a creative manner.
- d. Utilizes the unique capabilities of both teachers and media.
- e. Facilitates better communication and cooperation among its components.
- f. Facilitates analysis of when and how it (i.e., the system) needs to change.

APPENDICES

APPENDIX A

MICHIGAN STATE UNIVERSITY East Lansing, Michigan 48823

Instructional Media Center

Dr. John Doe
Erickson Hall

Dear Dr. Doe:

You are very much aware, I know, of the importance of teacher education at pre-service level in the use of instructional media. We are currently seeking several professors of elementary education like yourself who utilize media in achieving their own course objectives and who could be helpful to us in planning an improved teacher education program in media for our prospective elementary teachers.

We need essentially two kinds of assistance: your analysis of the degree to which our elementary education students are presently acquiring media competencies and your judgment as to points in the elementary program at which specific competencies might most logically be introduced. Enclosed is a list of media competencies, abstracted from the literature, which might be useful to you in considering these questions.

Miss Marie McMahan, an experienced teacher educator, is conducting a study, as part of her doctoral dissertation, of alternative ways of developing necessary media competencies and would like an opportunity to talk with you about the two points listed above. If you agree to participate, she'll be getting in touch with you shortly to work out details.

Please give me an early call or note indicating your reaction.

Cordially,

Charles F. Schuller,
Director
Instructional Media Center

CFS:mm

Enclosure

Introductory Comments--Faculty Interview

This study deals with the development of competencies in the selection, utilization, and production of audiovisual media. The term audiovisual media, as used here, refers to the total range of non-print materials from very unsophisticated devices such as bulletin boards and flannel boards to media such as instructional television, simulation, and multi-media instructional programs.

Since many universities are unable, for various reasons, to provide a basic audiovisual course for all prospective teachers, this study will attempt to explore one possible alternative method of developing media competencies. Specifically, it will seek to determine the feasibility of developing needed competencies within existing methods courses and other courses in education, where appropriate, with the help of self-instructional programs for individual students and packaged multi-media programs suitable for use by single classes or by large groups as desired.

In order to study the desirability of the above procedure, representative professors of elementary education at Michigan State University, knowledgeable in the area of media, have been asked about their willingness to react to certain questions. Since you have kindly agreed to participate, I should like to secure your reaction to the following questions:

Faculty Interview Form

Name of faculty member _____

Date interviewed _____

Course(s) taught by faculty member: _____

1. In general, what is your perception of the degree to which competency in selection and utilization of audiovisual media is currently being developed by elementary prospective teachers at Michigan State University?

2. Please indicate your perception of the degree to which each of the following specific competencies has been developed by students when they enter your class. Use a 5-point scale as follows:

	1	2	3	4	5
	Well- Developed	Somewhat Developed	May or May Not be Developed	Probably Not Developed	Definitely Not Developed
Competency 1					
Competency 2					
Competency 3					
Competency 4					
Competency 5					
Competency 6					
Competency 7					
Competency 8					
Competency 9					

3. If there were an optimum point during the teacher education sequence for development of each competency, what do you think it would be?

	Education 200	Education 321A	Methods Course (Which One?)	Student Teaching
Competency 1				
Competency 2				
Competency 3				
Competency 4				
Competency 5				
Competency 6				
Competency 7				
Competency 8				
Competency 9				

4. What other suggestions do you have regarding how the indicated competencies might best be achieved?

APPENDIX B

Previous Experiences with Media

Name _____ Class _____ Term _____

Check items which relate to you: ___Sophomore ___Junior

___Senior ___Have done student teaching

___Have had teaching experience

Directions for Use of Check Sheet

1. In column 1 please check each media type that you have observed a professor using in any of your classes.
2. In column 2 please check each media type that a professor has given you some assistance in knowing how to select.
3. In column 3 please check each media type that a professor has given you some assistance in knowing how to utilize.
4. In column 4 please check each media type that a professor has given you some assistance in knowing how to produce.
5. In column 5 please check each media type that you have used to teach something to pupils in a student teaching situation or to your peers in a college class.

Media Type	Column				
	1	2	3	4	5
Educational Tours					
Resource People					
Objects or Models					
Dramatization					

Media Type	Column				
	1	2	3	4	5
Puppets or Marionettes					
Simulation or Role Playing					
Chalkboard					
Flannel Board					
Bulletin Board					
Magnetic Board					
Motion Pictures					
Instructional Television					
Videotape					
Flat Picture					
Filmstrip					
Slide					
Overhead Projector Transparency					
Record					
Tape Recording					

Media Type	Column				
	1	2	3	4	5
Map					
Globe					
Graph					
Teaching Machine					
Programed Text					
Electric Board					

APPENDIX C

A Continuum of Audiovisual Media¹

Community Resources	Dramatization Devices	3-D Devices	Demonstration Devices	Display Devices	Projected Devices	Still Picture Devices	Audio Devices	Graphics Devices	Teaching testing Devices
Education- al Tours Resource People Museums	Dramatic Play	Objects	Chalkboards	Bulletin Boards	Motion Pictures	Flat Pictures	Disk Re- cordings	Maps	Teaching Machine Programs
	Dramatization	Models	Flannel Boards	Pegboards	Television	Filmstrips	Tape Re- cordings	Charts	Program- ed Text
	Puppets	Dioramas	Plastic Boards	Hook and Loop Boards	Videotape	Slides		Graphs	Program- ed Text
	Marionettes	Mock-ups	Magnetic Boards			Transparencies	Radio	Diagrams	Scrambl- ed Books
	Simulation	Specimens Globes		Displays		Stereographs		Cartoons	Electric Boards
						Microprojector Slides			Computer- Assisted Instruc- tion

¹This hand-out accompanied a slide-tape presentation designed to introduce the children's literature students to the whole range of audiovisual media. Arranged in a general way from those media which are concrete to those which are abstract, it was adapted from a "Cone of Experience" designed by Edgar Dale.

Characteristics of Specific Media Types	Educational Tours	Resource People	Dramatization	Puppets & Marionettes	Objects & Models	Dioramas	Plannel & Magnetic Boards	Plastic Boards	Chalkboards	Bulletin Boards	Displays	Television	Videotapes	Motion Pictures	Filmstrips	Flat Pictures	Slides	Transparencies	Disk Recordings	Tape Recordings	Maps, Charts, & Graphs	Programed Texts	Electric Boards
Senses Involved:																							
Visual only																							
Audio only																							
Visual & audio																							
Visual & tactile																							
Visual, audio, & tactile																							
Type of Visual:																							
Projected																							
Non-projected																							
Motion																							
Simulated motion																							
Still																							
Two-dimensional																							
Three-dimensional																							
Superimposed																							
Pictorial																							
Symbolic																							
Concrete																							
Equipment:																							
Required																							
Not required																							
Useful, but not required																							
Readily available																							
Speed of Use:																							
Fixed																							
Regulated by user																							
Sequence:																							
Fixed																							
Regulated by user																							
Type of Use:																							
Individual																							
Group																							
Long term																							
Short term																							
Availability:																							
Commercially-made																							
Locally-made																							
Inexpensive																							
Easy to produce																							
Difficult to produce																							

APPENDIX D

Script for Self-Instructional Program
on Transparencies

Many teachers today are finding that the overhead projector can assist them in solving a variety of instructional problems.

Transparency 1.--To discover some of the ways in which overhead projector transparencies are unique, remove transparency number 1 from the box and place it on the lighted viewer. Try folding back the overlays and then superimpose them on the base transparency once more in the correct sequence.

You'll find that the grease pencil in the box does an excellent job of adding information to the transparency and that the marks can be easily erased with a kleenex.

Transparencies have special kinds of characteristics which make them unique and which dictate the manner in which they can be utilized in achieving instructional objectives.

Turn to your Worksheet on Transparencies. On page 1 you will find a section listing characteristics inherent in various media types, some of these being pertinent to transparencies, some not. Try selecting from among these characteristics the four or five which you feel best describe overhead projector transparencies.

Transparency 2, Characteristics.--Which characteristics did you check? On transparency 2 you will find the ones to be discussed in this program. Flip back the opaque overlay strips, one at a time, as you are ready to view each succeeding characteristic (Strip 1).

Transparencies involve the visual sense only (Strip 2). They are primarily a still visual type (strip 3), but can, on occasion, be utilized to depict simulated motion. One of their most unique characteristics is that, unlike other projected materials (strip 4), they can be superimposed on each other, thus achieving kinds of instructional objectives not possible with most other media types (Strip 5). Like other projected visuals, they can be enlarged and, in this form are usable by groups, whereas in their original form they were not (Strip 6). Transparencies have one additional characteristic not typical of most other media: they can be marked on and erased.

These characteristics of transparencies, like those of other media, are important, for they help in determining appropriate uses. Cognizant of the characteristics of transparencies, we can examine, for instance, how the fact that materials can be manipulated on the stage of the overhead projector suggests ways in which they can be used.

Transparency 3.--Teachers or pupils can move characters about on the stage as they share stories with each other. A colored background can be utilized, or scenes can be painted on a movable acetate roll that many overhead projectors possess.

Transparency 4.--Arithmetic processes can be demonstrated with cut-out objects, plastic dime store objects, or checkers. If desired, an opaque paper can be held in front of the lens while removing objects.

Transparency 5.--The opaque cut-outs accompanying this transparency represent two basketball teams which can be manipulated to illustrate offensive and defensive positions.

Transparency 6.--Opaque hands for a clock face can be manipulated by pupils to depict different times of the day.

Transparency 7, Superimposed Visuals.--The overhead projector, unlike most other audiovisual equipment, can use visuals which are superimposed upon a base transparency. This feature of the overhead makes many interesting instructional tasks possible.

Sometimes, as in Transparency 7, transparent overlays are used to depict a process--in this case the territorial growth of our country.

Transparency 8.--Superimposed images are useful, too, in showing relative sizes of things--in this case the equivalence of the fractions $1/4$, $4/16$, and $25/100$, and here

Transparency 9.--The relative sizes of the United States, Brazil, and Argentina.

Transparency 10.--In other cases, transparent overlays facilitate the depicting of other kinds of relationships. Here, for example, the relationship of topography to history is shown as one sees and understands the routes by which settlers first moved inland from the coast.

Transparency 11.--Transparency 11, as presently organized, shows the relative elevations of different parts of the United States. With another overlay showing crops, occupations, or rainfall, various geographic relationships could be identified.

Transparency 12.--That green is a combination of yellow and blue is graphically demonstrated by this overlay transparency, which helps one better understand the relationships of various colors.

Transparency 13.--Opaque overlay transparencies can also be used, these enabling one to reveal a process, step by step, as shown here.

Transparency 14.--Disclose or conceal information, as depicted here.

Transparency 15.--Or reveal only part of the available information, as shown here.

Transparency 16, Enlarged Visuals.--The fact that transparencies are projected visuals means that, like other projected visuals, they enlarge materials which

are too small to see at a distance. This fact has many interesting implications.

Suppose, for example, that one wanted to enlarge these letters. He could move the projector back as far as necessary to project the letters at the desired size, enlarge them on the chalkboard or on paper, and trace them with ink.

Transparency 17.--Or note that this plastic ruler, too small to be read in its initial state, becomes very legible when projected and is appropriate for giving students practice in measuring.

Transparency 18.--On many occasions, you may wish to show a magazine picture to a group but find yourself without either an opaque projector or a darkened room. A simple process which will be described later enables you to transfer the ink from a magazine page to an acetate sheet, thus making it possible to project the picture on the overhead projector.

Transparency 19.--Sometimes you will need a map of an area currently in the news and will discover, much to your disgust, that all of your maps are outdated. A small newspaper map, run through a transparency-producing machine in a few seconds, can be projected large enough for a group to see.

Transparency 20, Visuals that can be Written on and Erased.--One characteristic that transparencies have which most media do not is that they can be written on and the writing subsequently erased. This makes many demonstrating and testing activities possible. For example, a grease pencil can be utilized to demonstrate how to fill in a check or other business form.

Transparency 21.--To fill in blanks in a completion exercise.

Transparency 22.--To select an answer from a group of possible answers.

Transparency 23.--To match a question and answer.

Transparency 24.--Or to illustrate a musical score.

Transparency 25, Brainstorming about Transparencies.--

We have been looking at some examples of the fact that characteristics of a transparency determine its uses. There are many ways of using transparencies not mentioned in this program, some of which have probably been running through your mind as you used the program and began to speculate about applications that this media type might have for you. Turn to Page 2 of your Worksheet on Transparencies and jot down three or four of your ideas opposite the appropriate characteristics. When you have finished, refer back to this program for a discussion of types of transparencies and procedures for making them.

Transparency 26, Types of Transparencies.--We have been looking at a variety of uses of transparencies but have not, in the meantime, considered the various types that can be produced.

Transparency 27.--Here is a matte acetate transparency, one of the simpler kinds of permanent transparency to make.

Transparency 28.--This is a temporary transparency, made by using transparent grease pencils on clear acetate.

Transparency 29.--If you wish more permanent clear acetate transparencies, they can be produced, as was this one, by using nylon tip markers on clear acetate.

Transparency 30.--Thermofax transparencies are among the simplest machine-made ones. Here is a direct image positive Thermofax transparency.

Transparency 31.--This is the same type of transparency, except that it has been colored with nylon tip markers.

Transparency 32.--This, again, is a direct image positive Thermofax transparency, colored with adhesive back acetate.

Transparency 33.--This, too, is a Thermofax transparency, made on one of the tinted films. These come in red, blue, yellow, or green tints.

Transparency 34.--This is a Thermofax negative transparency. As you can see, it is opaque and projects black except for the lines, which project the same color as the film. Negative transparencies are dramatic when a single sheet suffices to convey the message, but are not useful when overlays are required.

Transparency 35.--This is a diazo transparency. As you will note, each overlay is of a different color. This type of transparency is somewhat more complicated to make than those previously described.

Transparency 36.--This transparency is made from a magazine picture and is called a picture transfer transparency. It can be produced in about ten minutes.

In this program we have been thinking together about the characteristics of transparencies and the resulting implications for their use. We have looked, too, at some of the types of transparencies which can be produced by teachers and children. Once one has a sketch (called a master) from which to make his transparency, the actual production is usually a relatively simple process. The next portion of this program will describe the procedure for making:

1. Matte acetate transparencies
2. Clear acetate transparencies
3. Thermofax transparencies
4. Picture transfer transparencies

Work Sheet on Transparencies

Name _____ Class _____ Date _____

(From time to time as you use this self-instructional program you will be asked to stop the recorder and react to a specific question or problem on this sheet. In most cases, the questions will ask you not merely to recall information but to apply it to the solution of new problems and the generation of new ideas.)

I. CHARACTERISTICS OF TRANSPARENCIES

Listed below are some characteristics which apply to various types of non-projected media. Check the four or five which you feel best describe transparencies. When you have finished, change the tape recorder to "play" position once more.

Senses involved

- ☐ Visual only
☐ Audio only
☐ Visual & audio
☐ Visual & manipulative
☐ All senses

Type of visual

- ☐ Motion visual (motion inherent in the medium)
☐ Simulated motion (motion provided by the user)
☐ Still visual
☐ Two-dimensional visual
☐ Three-dimensional visual
☐ Superimposed visuals possible
☐ Pictorial visual possible
☐ Symbolic visual possible
☐ Concrete visual possible

Equipment

- ☐ Equipment required
☐ Equipment can be used but not required
☐ Equipment not required
☐ Equipment readily available

Speed of use

- ☐ Speed of use fixed
☐ Speed of use regulated by user

Sequence of use

- ☐ Sequence of use fixed
☐ Sequence of use regulated by user

Type of use possible

- ☐ Usable by individual
☐ Usable by group
☐ Usable over long period (more than a day)
☐ Usable for only short period (less than a day)

Availability of media type

- ☐ Available from commercial sources
☐ Can be locally produced
☐ Easy to procure commercially
☐ Relatively inexpensive (unit price of \$10 or less)
☐ Relatively easy to produce
☐ Relatively difficult to produce

II. Brainstorming About Transparency Uses

(As you read the section of the script on purposes for which transparencies can be used, you undoubtedly thought of some other examples of transparencies illustrative of several of the uses. List three or four of these ideas opposite the appropriate categories.)

General Uses Growing out of
Characteristics of the Over-
head Projector and/or of
Transparencies

Specific Uses Growing Out
of These Characteristics

Uses growing out of provision
of the ability to manipulate
objects on the overhead pro-
jector stage (simulating
motion, grouping and regroup-
ing objects, etc.)

Uses growing out of provision
of the ability to employ plastic
overlays

Showing processes (natural,
industrial, production,
governmental, etc.)

Showing relationships
(geographic, historical
and topographical, organ-
izational, etc.)

Uses growing out of provision
of the ability to employ
opaque overlays

Showing a process

Revealing or concealing
something

Uses growing out of provision
of the ability to enlarge
materials that, unprojected,
are too small to be viewed
by a group

Uses growing out of provision
of the ability to mark on a
transparency and subsequently
erase the marks

Demonstrating filling in a
form

Giving experience in matching
items that go together

Giving experience in selecting
an item from a group of items

Giving experience in filling
in blanks

Other possible uses (please
be specific)

III. Evaluation of This Self-Instructional Program

Check items which relate to you.

1. Level:

____ Sophomore ____ Junior ____ Senior ____ Graduate student

2. Teaching experience

None Student teaching Regular teaching

3. Previous experience with this media type:

 Much Quite a bit Some Hardly any

None

4. Level of this program in relation to my background:

___Difficult ___Somewhat
 difficult

___About ___Rather ___Simple
 right simple

5. Ideas that I generated after using this program:

 Many Quite a few Some Hardly any None

6. Parts of this program which I found unclear: (Please be specific)

BIBLIOGRAPHY

BIBLIOGRAPHY

- Allen, W. H. Research verified the value of audio-visual materials. National Education Association Journal, 1952, 41, 49.
- Allen, W. H. Research on new educational media: Summary and problems. AV Communication Review, 1959, 7, 83-97.
- Allen, W. H. (Ed.) A summary of the Lake Okoboji audio-visual leadership conferences, 1955-1959. Iowa City, Iowa: State University of Iowa, Extension Division, 1960.
- American Association for Colleges of Teacher Education. Professional teacher education--a programed design developed by the AACTE teacher education and media project. United States Office of Education, Department of Health, Education and Welfare, Educational Media Branch, Contact No. OE 3-16-006. AACTE, 1968.
- American Association for Colleges of Teacher Education. Standards for the accreditation of teacher education. (2nd draft) Washington, D. C.: AACTE, 1968.
- Arnsperger, V. C. Measuring the effectiveness of sound motion pictures as teaching aids. New York: Columbia University, Teachers College, 1933.
- Barson, J. A procedural and cost analysis study of media in instructional development. United States Office of Education Grant No. OE-3-16-030, Michigan State University, 1965.
- Barson, J. Instructional systems development project, final report, United States Office of Education Grant No. OE-5-16-025, Michigan State University, 1967.
- Bellach, Arno A. (Ed.) Theory and research in teaching. New York: Columbia University, 1963.

- Bloom, B., Englehart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. Taxonomy of educational objectives--handbook I: Cognitive domain. New York: Longmans Green, 1956.
- Brickell, H. M. Organizing New York state for educational change. Albany, New York: State Education Department, University of the State of New York, 1961.
- Briggs, L. J., Campeau, P. L., Gagne, R. M., & May, M. A. Instructional media: A process for the design of multi-media instruction, a critical review of the research, and suggestions for future research. Pittsburgh: American Institutes for Research, 1967.
- Briggs, L. J. Sequencing of instruction in relation to hierarchies of competence. Pittsburgh: American Institutes for Research, 1968.
- Bruner, J. S. Toward a Theory of Instruction. Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1967.
- Carpenter, C. R. Approaches to promising areas of research in the field of instructional television. In W. Schramm (ed.), New teaching aids for the American classroom. Stanford, California: Institute for Communication Research, 1960.
- Carpenter, C. R. A constructive critique of educational technology. AV Communication Review, 1968, 16, 21.
- Combs, A. W. The professional education of teachers. Boston: Allyn and Bacon, 1965.
- Curl, D. H. Self-instructional laboratories for teaching operation skills. In W. C. Meierhenry (ed.), Media competencies for teachers. National Defense Education Act, Title VII, United States Office of Education Contract No. 5-0730-2-12-6, University of Nebraska, 1966.
- Diamond, R. M. Reply to questions about systems. Audiovisual Instruction, 1965, 10, 366-70.
- Diamond, R. M. A rationale for decision: Selecting the right tool for the job. In R. E. Stepp (ed.), Research and utilization of educational media for teaching the deaf. University of Nebraska, Department of Educational Administration, 1966.

- Finan, J. L. The system concept is a principle of methodological decisions. In R. M. Gagne (ed.), Psychological principles in system development. New York: Holt, Rinehart, and Winston, 1962.
- Finn, J. AV development and the concept of systems. Teaching Tools, 1956, 3, 1963-64.
- Flanders, N. A. Teacher influence--pupil attitudes and achievement. United States Office of Education, Department of Health, Education, and Welfare, Project No. 397, University of Minnesota, 1960.
- Fulton, W. R., & White, F. A. What constitutes teacher competence in audio-visual education? Phi Delta Kappan, 1959, 40, 159.
- Fulton, W. R. Audio-visual competence and teacher preparation. The Journal of Teacher Education, 1960, 11, 493.
- Fulton, W. R., & Rupiper, O. J. Selected vicarious experiences versus direct observation experiences of preservice teachers in the foundation areas of professional preparation at the University of Oklahoma. National Defense Education Act, Title VII, Project No. 102. University of Oklahoma, 1961.
- Gage, N. L. Paradigms for research on teaching. In N. L. Gage (ed.), Handbook of research on teaching. Chicago: Rand McNally, 1963.
- Gage, N. L. Theories of teaching. In E. Hilgard (ed.), Theories of learning and instruction, 63rd yearbook of the National Society for the Study of Education, Part 1. Chicago: NSSE, 1964.
- Gagne, R. M., Mayor, J. R., Garstens, H. L., & Paradise, N. E. Factors in acquiring knowledge of a mathematical task. Psychological Monographs: General and Applied, 1962, 76, (Whole No. 526).
- Gagne, R. M. The conditions of learning. New York: Holt, Rinehart and Winston, 1965.
- Gardner, J. W. Self-Renewal. New York: Harper and Row, 1963.
- Gerlach, V. Selecting an instructional medium. In W. C. Meierhenry (ed.), Media competencies for teachers, National Defense Education Act, Title VII, United States Office of Education Contract No. 5-073-2-12-6, University of Nebraska, 1966.

- Good, C. V. Essentials of educational research. New York: Appleton-Century-Crofts, 1966.
- Goodlad, J. I. The future of learning and teaching. AV Communication Review, 1968, 16, 5-6.
- Griffiths, D. C. Administrative theory and change in organizations. In M. B. Miles (ed.), Innovation in education. New York: Columbia University, Teachers College, Bureau of Publications, 1964.
- Heinich, R. Systems applications in education. In Summary Report, 13th Lake Okoboji Educational Media Leadership Conference. Iowa City, Iowa: University of Iowa and Department of Audiovisual Instruction, 1967.
- Hite, H. A study of teacher education methods for audio-visual competency in Washington--1939-1947. Unpublished dissertation, Washington State University, 1951.
- Hoban, C. F. A systems approach to audio-visual communication. In Summary Report, 2nd Lake Okoboji Audio-Visual Leadership Conference. Iowa City, Iowa: University of Iowa and Department of Audiovisual Instruction, 1956.
- Hoban, C. F. Implications of theory for research and implementation in the new media. Paper presented at the meeting of the Conference on Theory for the New Media, East Lansing, Michigan, March, 1962.
- Hopkins, R. C. A systematic approach to systems development. Santa Monica, California: System Development Corporation, 1960.
- Hyer, A. L. Mainlines for 1959. Audiovisual Instruction, 1959, 3, 40.
- Imbrock, P. H. Pre-service education of teachers in the use of audio-visual materials of instruction. Unpublished dissertation, Columbia University, 1950.
- Kerlinger, F. L. Foundations of behavioral research. New York: Holt, Rinehart, and Winston, 1966.

- Kemp, J. E. 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, National Defense Education Act, Title VII, United States Office of Education Contract No. 5-073-2-12-6, University of Nebraska, 1966.
- Kersh, B. Y. Classroom simulation: A new dimension in teacher education. Monmouth, Oregon: Oregon State System of Higher Education, 1965.
- Krathwohl, D. R., Bloom, B. S., and Masia, B. B. Taxonomy of educational objectives: The classification of educational goals. Handbook II: Affective domain. New York: David McKay Co., 1964.
- LaGrone, H. F. A proposal for the revision of the pre-service professional component of a program of teacher education. Washington, D. C.: American Association for Colleges of Teacher Education, 1964.
- Leeper, Robert (ed.) Strategy for curriculum change. Washington, D. C.: Association for Supervision and Curriculum Development, 1965.
- Lionberger, H. F. Diffusion of innovations in agricultural research and in schools. In R. R. Leeper (ed.), Strategy for curriculum change. Washington, D. C.: Association for Supervision and Curriculum Development, 1965.
- Lumsdaine, A. A. Instruments and media of instruction. In N. L. Gage (ed.), Handbook of research on teaching. Chicago: Rand McNally, 1963.
- Macdonald, J. B., and Leeper, R. R. Theories of Instruction. Washington, D. C.: Association for Supervision and Curriculum Development, 1965.
- Mager, R. F. Preparing objectives for programmed instruction. San Francisco.
- Meierhenry, W. E. (ed.) Learning theory and audiovisual utilization. AV Communication Review, 9, 1961.
- Meierhenry, W. C. (ed.) Media competencies for teachers. National Defense Education Act, Title VII, United States Office of Education Contract No. 5-073-2-12-6, University of Nebraska, 1966.

Michigan State University Catalog. East Lansing, Michigan: Michigan State University, 1966.

Miles, M. B. (ed.) Innovation in education. New York: Columbia University, Teachers College, Bureau of Publications, 1964a.

Miles, M. B. On temporary systems. In M. B. Miles (ed.), Innovation in education. New York: Columbia University, Teachers College, Bureau of Publications, 1964b.

Miller, E. E. Instructional systems development. Unpublished doctoral dissertation, Michigan State University, 1967.

Norberg, K. Theoretical background required by teachers in the use of newer media. In W. C. Meierhenry (ed.), Media competencies for teachers. National Defense Education Act, Title VII, United States Office of Education Contract No. 5-073-2-12-6, University of Nebraska, 1966.

Oliver, G. G. 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, 1962.

Pascoe Report. Audiovisual Instruction, 1959, 4, 6-7.

Pressey, S. L. Development and appraisal of devices providing immediate automatic scoring of objective tests and concomitant self-instruction. Journal of Psychology, 1950, 29, 417-447.

Publication Manual of the American Psychological Association (1967 revision). Washington, D. C.: APA, 1967.

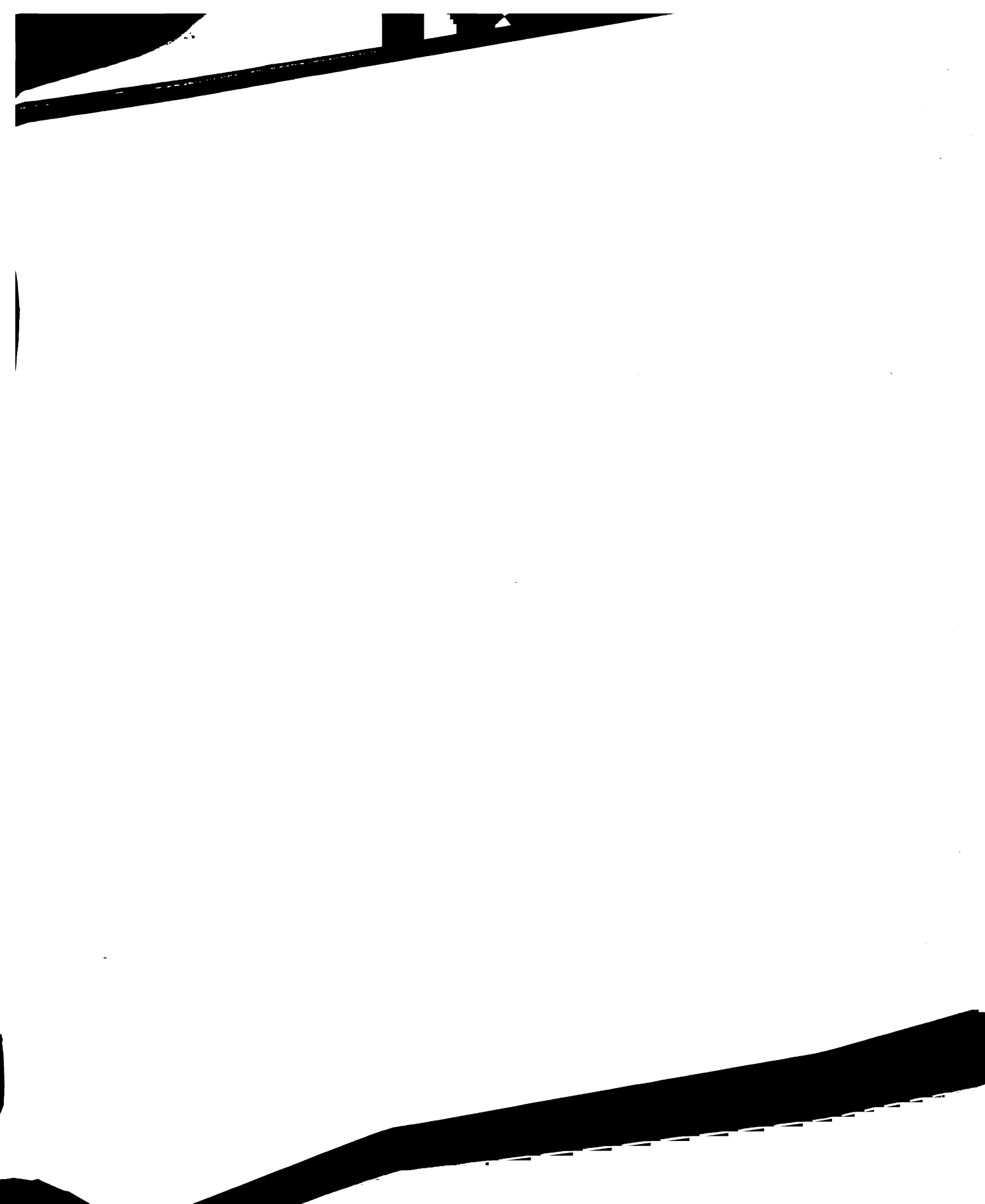
Rogers, E. M. Diffusion of innovations. New York: Free Press of Glencoe, 1962.

Sanders, Norris M. Classroom questions--What kinds? New York: Harper and Row, 1966.

Schueler, H., & Lesser, G. S. Teacher education and the new media. Washington, D. C.: American Association for Colleges of Teacher Education, 1967.

- Schuller, C. F. Systems approaches in media and their application to individualized instruction at the university level. Paper presented at Bucknell University, February, 1968.
- Shane, G. H. Future shock and the curriculum. Phi Delta Kappan, 1967, 49, 67-71.
- Silvern, L. C. Reply to questions about systems. Audio-visual Instruction, 1965, 10, 366-70.
- Stepp, R. E. (ed.) Research and utilization of educational media for the hearing impaired. Symposium for administrators of schools for the deaf, Lincoln, Nebraska, May, 1965.
- Streeter, C. E. A study of relationships among selected factors affecting media use by classroom teachers within selected school systems. Unpublished doctoral dissertation, Michigan State University, 1967.
- Suchman, J. R. The elementary school training program in scientific inquiry. United States Office of Education, Title VII, Project No. 216. University of Illinois, 1964.
- Symonds, P. M. What education has to learn from psychology. New York: Columbia University, Teachers College, Bureau of Publications, 1965.
- Taba, H., & Hill, J. Teacher handbook for Contra Costa social studies, grades 1-6. Hayward, California: Rapid Printers and Lithographers, 1965.
- Thelen, H. A. Programed instruction: Insight vs conditioning. Education, 83, 1963.
- Torkelson, G. M. An experimental study of patterns for improving the preparation of pre-service teachers in the use of audiovisual materials and of effects on pupils. National Defense Education Act, Title VII, Project No. 079m, Grant No. 7-48-0720-034, The Pennsylvania State University, 1965.
- Torkelson, G. M. 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. National Defense Education Act, Title VII, United States Office of Education, Contract No. 5-0730-2-12-6, University of Nebraska, 1965.

- Traverse, R. M. W. (ed.) Research and theory related to audiovisual information transmission. Office of Education Contract No. 3-20-003. 1964.
- Trow, C. T. Teacher and Technology. New York: Appleton-Century-Crofts, 1963.
- Trzebiatowski, G. L. An evaluation of the instructional systems approach in higher education. Unpublished doctoral dissertation, Michigan State University, 1967.
- Verduin, J. H. Conceptual models in teacher education. Washington, D. C.: American Association of Colleges for Teacher Education, 1967.
- Wallen, N. E., & Traverse, R. M. W. Analysis and investigation of teaching methods. In N. L. Gage, (ed.), Handbook of research on teaching. Chicago: Rand McNally, 1963.
- Wendt, P. R., & Butts, G. K. Audiovisual materials. Review of Educational Research, 1962, 32, 141-156.
- Wiles, K. Proposals of strategies: A summary. In R. L. Leeper (ed.), Strategy for curriculum change. Washington, D. C.: Association for Supervision and Curriculum Development, 1965.
- Witt, P. W. F. Technology, Teaching, and Human Values. Paper presented at the Sixth Joint Conference of the Michigan Audiovisual Association, Michigan Association for Supervision and Curriculum Development, and Michigan Association of School Librarians, Lansing, Michigan, November, 1968.
- Wittich, W. A., & Fowlkes, J. Audiovisual paths to learning. New York: Harper, 1946.
- Wittich, W. A., & Schuller, C. F. Audiovisual materials: their nature and use. New York: Harper, 1967.



MICHIGAN STATE UNIV. LIBRARIES



31293102377581