R E P O R T R E S U M E S

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A PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT. QUARTERLY TECHNICAL REPORT.

BY- DRESSEL, PAUL L. AND OTHERS
MICHIGAN ST. UNIV., EAST LANSING

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DESCRIPTORS- *SYSTEMS DEVELOPMENT, SYMPOSIA, MODELS, SYSTEMS ANALYSIS, *INSTRUCTIONAL MATERIALS, *INSTRUCTIONAL TECHNOLOGY, EDUCATIONAL FINANCE, *PROGRAM COSTS, *PROGRAM PLANNING, INSTRUCTIONAL IMPROVEMENT, *AUDIOVISUAL INSTRUCTION, EAST LANSING

A BROAD STUDY WAS CONDUCTED OF THE DEVELOPMENTAL PROCEDURES AND COSTS OF THE NEWER MEDIA PREPARED FOR COURSE INSTRUCTION AT MICHIGAN STATE UNIVERSITY. DETAILS OF THE STUDY WERE PRESENTED IN TWO SEMINAR PAPERS THAT WERE PRESENTED AS DISSEMINATION REPORTS IN 1965 AT THE NATIONAL CONFERENCE OF THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION IN CHICAGO, AND AT THE DEPARTMENT OF AUDIOVISUAL INSTRUCTION CONVENTION IN MILWAUKEE. THE FIRST PAPER DISCUSSED THE RELATION OF SYSTEMS METHODOLOGY TO UNIVERSITY CURRICULAR AND INSTRUCTIONAL PLANNING. ATTENTION WAS FOCUSED ON (1) THE ANALYSIS OF THE COMPONENTS REQUIRED WITHIN THE INSTRUCTIONAL SYSTEM, (2) THE DESIGN OF DEVELOPMENTAL PROCEDURES NEEDED TO PRODUCE THE SYSTEM, AND (3) FIELD TRIALS OF THESE DEVELOPMENTAL PROCEDURES. THE SECOND PAPER DISCUSSED THE FUNCTIONS OF THE MEDIA SPECIALIST BY (1) IDENTIFYING A LOGICAL SEQUENCE OF MAJOR DECISIONS AND (2) ANALYZING THE PROBLEMS OF TRANSLATING DECISIONS INTO ACTUAL INSTRUCTIONAL MATERIALS. MEANS OF MOTIVATING FACULTY TO UNDERTAKE USE OF NEWER MEDIA WERE ALSO DISCUSSED.(AL)

A PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT

(USOE Contract OE-3-16-030)

Quarterly Technical Report

Period Ending: March 31, 1965

Advisory Committee

Dr. Paul L. Dressel, Chairman
Dr. Charles F. Schuller
Dr. J Don Edwards

PART A - PROCEDURAL ANALYSIS

Director: Dr. John Barson

Associate Director:
Dr. Horace C. Hartsell

PART B - COST ANALYSIS

Director: Dr. Gardner M. Jones

Staff Specialists

Dr. John M. Gordon, Jr.
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Dr. T. Harry McKinney
Mr. George Tatu
Mr. Albert Ewald
Mr. Wayne Cunningham
Mrs. Carol Cunningham

Operating Under a Grant Authorized by
Title VII B of the National Defense Education Act

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and

Stages of Investigation

EXHIBIT I

A PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT

Summary of Organizational Activities
and
Stages of Investigation

PART A

JANUARY FEBRUARY MARCH

Organizational Activities

During this period, most of the new organizational activities involved planning for cooperative efforts between Parts A and B in preparing the final report of this project. Meetings were held with Dr. Gardner Jones and the Project Advisory Committee to review the outline plans for the final document.

Within Part A, staff organizational activities during the period consisted of preparing dissemination reports for presentation at the American Educational Research Association national conference in Chicago (February, 1965) and the Department of Audiovisual Instruction convention in Milwaukee (April, 1965). Copies of these papers are included in the Appendix of this report.

Preparations were also made for the review of project conclusions by consultants scheduled for an April visit. These persons are: Dr. James D. Finn, Chairman of the Department of Technology at the University of Southern California, and Dr. Wesley C. Meierhenry, Assistant Dean of Teachers College, University of Nebraska.

Stages of Investigation

Study Phase I:

The information gathered from various Michigan State University instructional systems case studies was edited into a format, which will permit quick review by readers and be directed at questions likely to be foremost in their interests.

Study Phase II:

Instructional systems development work and associated production was conducted with the following departments on the MSU campus: Electrical Engineering, Speech, Teacher Education, and the Social Science Division of American Thought and Language. Varying progress has been made in the production of materials resulting from the instructional systems development sessions conducted with the faculty in each of these departments.

Study Phase III:

Specific procedures for developing instructional systems have been derived from the experiences and analysis of activities within the Study. These procedures have been incorporated into flow-charts which appear applicable to most instructional areas in higher education.

Study Phase IV:

Formal reports prepared for symposia at American Educational Research Association convention and the convention of the Department of Audiovisual Instruction, were distributed to observers at these presentations and to mail requestors, for dissemination and evaluation purposes. An invitation for reactions was extended to the 105 parties in the United States and Canada requesting this information. Several replies have been received and are encouraging in their assessment of these position papers.

In addition to the position papers presented at the aforementioned symposia, a copy of a report on these presentations by Dr. Phil Lange, of Teachers College, Columbia University, is enclosed in the Appendix.

EXHIBIT I

A PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT

Summary of Organizational Activities
and
Stages of Investigation

PART B

JANUARY FEBRUARY MARCH

COST ANALYSIS STUDY

Phase I:

a) Annotated Bibliography has been reproduced for internal use. There will be a few additional entries before final publication. The Bibliography will appear as Part V of the Combined A and B Final Report and also as part of the separate Cost Monograph.

Phase II:

a) Visitations. Dr. Gardner Jones went to the Air Force Academy and Air Training Command (Sheppard AFB) in November for discussion of costing experience. All accounting being done at this institution is on a Fund Obligation basis.

Don Edwards visited a Programmed Instruction group at Keesler AFB and brought back some course development procedures materials (diagrams) which have been turned over to Part A staff. They are very parallel to Part A's diagrams for course development.

b) Part B staff have written portions of cost concepts materials in sections which fit various parts of Cost Monograph outline, and portions of Final Report material, which fit Final Report outline. Material for B part of the Final Report is beginning to "fall into place" and much of it is ready to be integrated with parallel Part A material.

c) One staff member has continued study of faculty time usage in the Engineering course development trial through the winter quarter, as a

basis for costing out this experiment. Results are not yet summarized. We have good data for last summer and fall.

We found it unfeasible to obtain meaningful time usage information for the Theatre Arts experiment, beyond the film production stage. This may be as much due to our inability to educate the participants on reporting purposes and procedure, as to their different outlook toward personal time accounting.

d) Analysis of CCTV cost was completed, and Audiovisual costs are still in analysis but nearly complete.

Development of case history description of the Accounting-by-CCTV (Closed Circuit Television) experience is nearly complete.

Upon finishing these assignments, one team will construct the "Rock Study" case history, the other the "Chemistry Film" case history, after gathering the data needed to complete what the Audiovisual Center has accumulated regarding these media applications.

These case histories (brief sketches thereof) will be included in the Combined A and B Report.

e) Target date for completion of Combined Report is still June 30, including editing and printing of copies for internal use, copies for the United States Office of Education, and a limited number of copies for distribution as requested.

f) Part B staffing to June 30 (all on a half-time basis):

Jones - Director
Cunningham, C.
Cunningham, W.
Ewald, A.
Tatu, G.
Bournazous, J., Secretary

g) Dr. Jones does not contemplate completion of the Cost Monograph as of June 30, but has requested extension to July 31, with his full-time assignment to project from June 20 to July 31, and continuation of secretary for the same period.

EXHIBIT II

A PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT

Parts A and B Log Report

Quarter Ending: March 31, 1965

EXHIBIT II

PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT

Office of Institutional Research
Audiovisual Center and the College of Business
Michigan State University
Project Term - June 26, 1963 - June 30, 1965

PART A - LOG REPORT

Project Period	Log Entry
January 1 - March 31, 1965	NOTE: The press of summarizing study findings for inclusion in the final report and preparation of interim dissemination papers, preempted the time necessary for maintaining a daily log of project activities. It was judged that these efforts could better be used in refining the final report; thus, no log reports are included with this quarterly report.

EXHIBIT III

MICHIGAN STATE UNIVERSITY

U. S. OFFICE OF EDUCATION OE-3-16-030
Statement of Expenditures for the Period
January 1, 1965 - March 31, 1965

PARTS A AND B

Expenditures:		
Personnel	$ 13,903.28	
Employee Benefits	1,514.41	
Travel	999.62	
Materials and Supplies	259.16	
Services	3,542.15	
Equipment Rental	1,072.50	
Communications	128.55	
Reproduction	(283.43)	
Other	153.26	
Overhead	7,156.02	
TOTAL EXPENDITURES 1/1/65 to 3/31/65		$ 28,445.52

APPENDIX

A SYSTEMS APPROACH TO
CURRICULAR AND INSTRUCTIONAL PLANNING

A symposium conducted in Chicago
at the annual meeting of the
American Educational Research Association
February 10, 1965

PARTICIPANTS:

John Barson
Associate Professor, College of Education
and Director, Instructional Systems Development Study
Michigan State University

John M. Gordon, Jr.
Research Specialist
Instructional Systems Development Study
Michigan State University

W. Russell Hornbaker
Media Specialist
Instructional Systems Development Study
Michigan State University

SYMPOSIUM: A SYSTEMS APPROACH TO CURRICULAR AND INSTRUCTIONAL PLANNING

INTRODUCTION

The following paper partially describes the findings from a broad study of the development procedures and costs of the newer media in course instruction at Michigan State University.

This investigation is supported by a grant from the United States Office of Education, under the provisions of the National Defense Education Act, Title VIIB. Details of this Study will be presented in the above symposium at the 1965 Annual Meeting of the American Educational Research Association in Chicago, and in the FINAL REPORT OF THE PROCEDURAL AND COST ANALYSIS STUDY OF MEDIA IN INSTRUCTIONAL SYSTEMS DEVELOPMENT, available after July 1, 1965.

RELATION OF SYSTEMS METHODOLOGY TO UNIVERSITY CURRICULAR AND INSTRUCTIONAL PLANNING

Concerning an Instructional Systems Study

The improvement of instruction in higher education has become a major concern in the wake of changes visited on universities and colleges in recent years. In contrast to the once dominant position instruction occupied in higher education, it now competes with research and government service for limited faculty time and resources.

If instructional improvement is to meet this competition and the increasing demands for greater breadth and depth in various curricula, some extraordinary measures must be devised. In short, undergraduate and graduate instruction are in need of new procedures for planning, development, and operation. Among the alternatives proposed for such change, is the suggestion that the systems approach be employed in designing instructional development procedures.

An extensive study of instructional systems is nearing completion at Michigan State University. "A Procedural and Cost Analysis Study of Media in Instructional Systems Development", covers the period from 1963-1965, and centers on investigation of the development and use of the newer media in instructional systems. However, in this analysis, investigators were required to review aspects of procedures for general instructional system design as well.

The three purposes of the Study are: (1) the descriptive analysis and evaluation of instructional systems development activities at MSU during the period, 1963-1965; (2) the measurement of costs associated with instructional systems development; and (3) the development of hypothetical

models of instructional systems development procedures. This presentation attempts to explicate their experiences with the latter; i.e. the design of procedures for instructional systems development.

Conceiving the University as a System

General systems methodology permits a system to be defined as any grouping of components, which operates in concert or related fashion. It is not too difficult to employ this concept to describe a university. For purposes of the Study, investigators viewed the university as representing a sub-system of society, or in effect, a system in itself. Within its boundaries exist a number of sub-systems, among which the most pertinent to the Study are those systems providing resources and instruction. The employment of these systems relationships permitted investigators to concentrate their attention on intra-system operation without losing the perspective or identities of external conditions, which affect these sub-systems.

Attention was focused on (1) the analysis of the components required within the instructional system (IS); (2) the design of developmental procedures needed to produce the IS; and (3) field trials of these developmental procedures.

Identifying the Instructional System

One would be hard-pressed to closely relate to instruction all activities, persons, and facilities comprising a modern university. The investigators sifted through these components in order to select those particularly

relevant to the IS.

The boundary of the IS circumscribes only those sets of components which directly or terminally determine, through communications and decisions, the events enacted in course instruction. The set of components which affect the conduct of instruction remotely, are considered a part of a, as yet undefined, resources system, and contribute to the design of the IS through procedures in a developmental system. (See Diagram I, Appendix A). The identity of the components and relationships found within the IS are stated in the definition below:

> An Instructional System is a complex consisting of a learner(s) and a combination or all of the following components: instructor(s), material(s), machine(s), and technician(s), given certain inputs and designed to carry out a prescribed set of operations. This set of operations is devised and ordered according to the most recent and pertinent evidence from research and expert opinion such that the probability of attaining the output, specified behavioral changes in the components, is maximal.

It is probable that the definition of the IS appears mechanistic and unlike the value-laden meaning, usually associated with instruction. This effect is largely the result of the semantic differences which exist between the discourse of the academic disciplines and systems analysts. It should be pointed out, that definition of a theoretical relationship among components contributes only a start to constructing a purposeful instructional design. The more demanding task is the specification, ordering and implementation of the content and behaviors which produce the desired output or result. Some of the knowledge needed for such planning is evident in the instructional systems cases at Michigan State University, analyzed by the Study. A good deal more remains to be learned. To this end, the Study

undertook the design and trials of hypothetical models of instructional systems development.

IS Developmental Procedures

The location of the IS activities on a university campus is not an especially difficult task. Characteristically, the major portion of IS activity occurs within the classroom and study areas. On the other hand, the developmental procedures, which lead to IS realization, are incredibly diffuse in time and locale. From a course content standpoint, they may extend backward in time to the inception of a given discipline. From a behavioral standpoint, they may encompass the sum total of student and professorial life experiences.

These spectacular dimensions forced Study investigators to limit the analysis and design of development procedures to those which can be reasonably executed within the capability and competence of university personnel and resources.

Further structure was given these procedures through the conception of a Learning Resources Center, a specialized university facility dedicated to the analysis of instruction, the development of instructional strategies, and the provision of supporting materials and devices. A flow chart of the gross IS development procedures devised in the Study appears in Diagram 2, Appendix A.

These procedures apply primarily to the developmental activities involved for a complete redesign of course instruction. However, it is well-recognized that only a small number of cases would require such over-all

measures. More typically, faculty members seek assistance in implementing some portion or session within the course structure, while leaving the balance unchanged. The options for "mid-entry" or even "dipping" in the procedures, are not precluded in the investigators concept of the procedures operation.

Refinement of the IS Developmental Procedures

The first designs of IS development procedures were models which took into account most of the personnel and resources available, plus a few that logic suggested as necessary for the nature of this task. The procedural models were largely influenced by the background experiences of the investigators and the University, pertinent results from literature, and advanced thinking in the area of instructional design.

Provisions in the Study allowed for concurrent examination of instructional systems currently developing at the University and the selection of varying academic areas for more intensive analysis. The selection of developing courses in Electrical Engineering and Theatre Arts resulted in an opportunity to field test the hypothetical development procedures in Appendix A, Diagram 2.

Specialists for this exercise were drawn from existing staff of the University College Evaluation Services Bureau, the Audiovisual Center, and the Study. Comprehensive tape recordings were made of all encounters between faculty members in the selected academic areas and the specialists cited in the procedures. One purpose of the trials was to closely observe the efficiency of the model development procedures from their initiation

to use of resultant instructional design and materials. There were no plans in effect to evaluate the improvement in learning, except to sample subjective judgments of the professors involved. A second purpose of the trials was to continue the re-shaping of the model development procedures.

Preliminary appraisal of the model procedures suggests to the investigators that faculty members and specialists find them useful for instructional development, from both the standpoint of clarifying course objectives and selecting appropriate experiences and materials. The trial results did not suggest any major realignment of the procedures. Observations and post analyses suggest that the adjustment needs arise primarily from omission of detailed directives within the major steps of the procedures. Some of these adjustments may require the findings of new basic educational research. Other alterations are largely faculty and specialist competency-linked.

The nature of several of these problems uncovered, are treated in the next section of this discussion.

AIDS AND HINDRANCES IN SPECIFYING OBJECTIVES

The Course Planning Sub-System was hypothesized by first identifying the standard sequence of decisions that must be made. The decision sequence divided into three specialty groups; those dealing with evaluation, instruction, and media. The main functions of these specialty groups were thought to be:

Evaluation -- to help in identifying student behavioral objectives and developing pre and post criterion instruments.

Instruction -- to aid in the determination of strategy, i.e. self-study, need for live teacher, etc. (works primarily with behaviors)

Media -- to assist in making representational and transmission decisions (works primarily with teaching examples)

The instructor brings to the situation the ability to:

(1) clarify the department's objectives for the particular course in both content and behavior terms.

(2) specify the expected entry behavior of the students, and most important,

(3) develop meaningful teaching examples of the concepts and principles within the selected content.

Rather than be like the old saw that says, "Everybody talks about the weather, but nobody does anything about it", we undertook to do something about testing our hypothesized procedures in a design with instructors, teams of specialists, and course content as factors. The three "factors" were counterbalanced so that we could get some notion of where the

weaknesses of our procedures might lie. For example, might the ingenious, informed instructor be the key to success? Or do we need better trained and more specialized specialists? Or is it impossible because of the abstract nature to function with certain academic course content or objectives?

We were fortunate to have two disparate departments -- electrical engineering, and speech and theatre arts, both undergoing revision of their entry level course and willing to participate. Two separate instructors from each department, both assigned to teach the courses under study, volunteered their time and energies. Two separate teams of specialists were formed which included a representative of each of the following areas: evaluation, media utilization, graphics design, and film production. There were no personnel available to adequately play the roles of the instructional specialists as we saw the function. Not being able to find trained individuals for this role is one of the most important findings of the Study. As such, the media specialists were forced to play dual roles and go beyond media decisions. Most centers where activity of this sort was being carried out, employed media personnel in this capacity.

After filling out a questionnaire designed to elicit such input data as student enrollment, facilities allotment, finances, etc., the instructors began the course planning by meeting with the evaluation specialists. A Content-Behavior Matrix (See Appendix B-1) had been developed to help them zero in on their task. It was designed to provide a basic structure to facilitate the acquiring of the new frame of reference. The content categories represent what was to be learned, while the behaviors, what was to

be done with the content. The cells of the matrix identify item types such as multiple choice, completion, essay, etc., thus facilitating test development. Psychomotor and affective objectives were alluded to, but not specified by either department.

The initial discussions involved the instructor acquiring the new "behavioral frame of reference". There were also the usual problems of defining and differentiating behaviors and the propensity to use the verb, "understand". As the sessions continued, the definitional problems shifted from behavior to content: that is, what concepts, principles, etc. were the basis of the course. It was somewhat surprising to note that the instructors at times had more difficulty arriving at concepts and principles than deciding what to have the student do with them. They tended to think, as we all do, in terms of the teaching examples rather than the underlying concepts and principles. As such, the instructors repeatedly tried to teach the course: that is, talk in terms of these examplers rather than the concepts, and demonstrations rather than principles. It was also difficult for them to define entry or pre-requisite content-behavior.

Progress was closely related to the instructor's familiarity and depth within the subject matter. It would have been quite helpful, especially when the instructor was either new to the course or in areas in which he was not expert, to have been able to call upon a subject matter specialist -- a man who had been given released time to think about curricular matters. The results of one session (see Appendix B-2) are a step toward specific item writing.

Another tack was taken to arrive at the sequence of behaviors; that of beginning with the most complex desired behaviors and working backwards. Since it somewhat evaded the probing question of content and loosely structured the hierarchy of behaviors, the progress was considerably more rapid. The two results developed for Theatre Arts are found in Appendices B-3 and B-4. B-3 dealt with teaching examples, while B-4 attempted to maintain both sequence and a behavioral tone. The latter seemed to be a more workable form. Appendix B-5 represents the counterpart sequence for Electrical Engineering.

Because of scheduling problems, vacations, and other duties, the teams felt they had to call a halt at this point and employ yet another technique to be able to "be ready" for September. The meetings had begun in June. It was now August. The last, more familiar, format was to get out the syllabus, cut it into lecture hours, determine what main topics were to be covered, what back-up materials were needed to fill in, where more specific examples were needed, etc. (see Appendix B-6). A more detailed account of these procedures will be given by the next speaker. The question of instructional strategy was for the most part dismissed; the tieing of instructional activity to desired intermediate and terminal behaviors was deferred until more time and knowledge could be brought to bear on the problem.

The following conclusions can be made: (1) course planning is extremely time-consuming and, instructors who are involved, should be given released time commensurate with the task; (2) the level of specificity of objectives needed to determine instructional strategy is still a mystery -- mainly

because the guidelines underlying different strategies are yet to be drawn: (a) a major analytic and research effort is needed to make headway in this "no man's land" and (b) training institutions should concentrate on developing people to work in this vital area both at research and developmental levels; and (3) the systems analysis brought decision-areas into better focus, rather than providing rules for arriving at these decisions as we had first anticipated. Areas for research and development are more clearly specified. We need a Cape Kennedy for education. Hopefully, the R & D centers being instituted throughout the country will serve this function. Some of the more obvious problems are:

Content - What are the fundamental concepts and principles within the subject matter? Which are prerequisite and which are to be taught? What are the most meaningful examplars of these concepts and principles? Once students have acquired them, what are they to do with them?

Strategy - What clues within the framework of the association of behavior and content determine the instructional strategies? For example, what content-behavior is best suited for self-study? group activity? etc. How do you teach one to evaluate? to apply? to transfer?

Evaluation - What is the magic number of successful terminal behaviors to be considered a "pass"? or better yet, a B? Are they mastery or discriminating behaviors? How much value should be put upon a fundamental behavior or a vital behavior?

Just how specific should our terminal behaviors be, to be considered ready for implementation?

General - How much money and time should be appropriated to course development activities? How detailed should the production activities be, when it is fairly well established that method or materials differences, in university research, show no demonstrable affect upon performance?

THE AUDIOVISUAL CENTER AND THE DEVELOPMENT OF INSTRUCTION

Granted that some instructional materials will be necessary to most effectively and efficiently attain the learning objectives that have been specified, how are the materials to be located, selected, produced, and displayed?

At many universities, an Audiovisual Center has been established which has as part of its function the role of assisting faculty members to secure and successfully use various types of instructional materials (see Appendix C-1 and C-2). In recent years, the invention and development of new forms of recording, storing, retrieving, and displaying information, has grown to such proportions and at such a rate that several specialties have developed within the field of audiovisual education. As a result, at institutions of higher learning where the use of media has received some prominence it is not unusual to find the following specialists working as part of an Audiovisual Center, or as part of a somewhat newer organization sometimes called a Learning Resources Center.

1. Learning Resources Specialist

   Knowledgeable about materials, sources, cataloging, storage and care, and retrieval processes.

2. Graphics Specialist

   Skilled in design and production of charts, slides, transparencies, photos, and displays.

3. Film Production Specialist

   Skilled in design and production of educational films.

4. Instructional Television Specialist

Skilled in producing instructional television programs.

5. Distribution Specialist

Skilled in audio and video distribution systems and in the capabilities of all types of display equipment.

In some instances and with probably growing frequency, we find three additional types of specialists:

6. Programed Instruction Specialist

Skilled in design and writing of programed materials.

7. Media Specialist

Knowledgeable in all of the above specialties and in instructional theory and practice, as well as in curriculum development techniques.

8. Research Specialist

Knowledgeable in research methods and the media field.

The manner in which these specialists consult and help faculty to improve instruction cannot be described adequately in a few words or paragraphs. Partly, this is due to the fact that each problem brought to the Center by a faculty member is somewhat unique and the types of problems are very numerous.

At one extreme, there is the professor who desires a specific film; he knows the title, is familiar with the content, and has already decided

that this is exactly what he wants for his class. The help he needs is to locate a source and to secure the film at the desired time. What might be considered as the other extreme is the case of a faculty committee requesting help as they are starting to plan for the revision of the curriculum of an entire department and they feel that media should be "somehow involved".

If somewhere in the middle of this continuum we consider typical past experiences of Audiovisual Centers in assisting an instructor to locate, select, and procure or produce materials for use in a particular course or segment of the course, we have situations that resemble those studied by our Project.

Past experience has been that the instructor would often approach a given audiovisual specialist and somehow had predetermined that he wants graphics or film or television or audiotape, etc. While the specialist approached may refer the instructor to a different area (if, for example, he feels that the objectives clearly indicate that film is required rather than overhead transparencies), it is more commonly the case that the specialist initially approached concurs with the instructor and proceeds to produce the desired materials.

In order to carry out this production activity, the producer must question the instructor extensively as to objectives, conditions of use, and literally be "taught the course" by the instructor. Where more than one form of materials is being produced, each producer has to go through this same process with the instructor.

At some Audiovisual Centers there are audiovisual "generalists" which I have listed above as media specialists. Where such a person is contacted first by the instructor, he obtains from the faculty member this information regarding objectives and other input information thus saving the time and energies of the production specialist from being expended at this task. Also, he suggests the media which can best be utilized to meet the learning objectives and then arranges for the instructor to meet with the appropriate production and resources specialists.

It is from such experiences which we observed at MSU and at other institutions that we have patterned our hypothetical procedures, with the addition of attempting to make more explicit and efficient the process involved. The prior paper has presented some of our findings and preliminary conclusions concerning the first steps in the procedures, up to the steps dealing directly with materials.

Procedures for Locating, Selecting, Procuring, and Producing Materials

As a frame of reference for my comments regarding our experiences with the two field trials, I will briefly list our idealized procedures:

1. Statements concerning inputs, objectives, examples, and strategy decisions made to date are given to the audiovisual specialists by the media specialist and are given time to study them.

2. Learning Resources Specialist is called upon first to suggest materia that are available which may serve as exemplars for the course.

3a. A conference is held of all the audiovisual specialists, the instructor, and the coordinator.

--OR--

3b. The audiovisual specialists are called in one at a time as their specialty is required.

4. Decisions are reached as to materials and equipment needed for specified examples.

5. Commercially available materials are secured and examined by the instructor for approval.

6. Other materials are designed, produced, and approved by the instructor.

7. Materials are tried out on representative students, evaluated, and revised if necessary.

8. Provide practice for the instructor with new types of equipment and materials.

9. Assemble all materials and equipment and conduct a "dry run" with a selected group present to evaluate, to trouble-shoot, and to smoothe out the operation.

10. Make any necessary revisions.

11. Ready materials and equipment for a "field trial".

Field Trial -- Findings and Preliminary Conclusions

Even though the field trials described in the previous paper did not completely follow the procedures outlined for reasons mentioned earlier, there were a number of observations that are worthy of reporting and some tentative conclusions which can be made at this time.

In these cases, the services of the audiovisual resources specialist, the graphics production specialist, and the film production specialist, were called upon. Before calling on each of these, the media specialist suggested the medium to be used which on the basis of his knowledge and past experiences would best achieve the teaching examples that had been established.

It was possible to give the audiovisual resources specialist adequate information in terms of the type of material, topic desired, and suggested titles, so that very little time was required for him to meet with the instructor to determine requirements of the materials. In the case of certain materials, it was necessary for the instructor to examine them before making a final selection.

Likewise, when the graphics specialist was consulted, relatively little time was required to inform him of the course objectives before he was ready to discuss design and symbols with the instructor.

In other words, the graphics production specialist felt that the instructor had been well prepared so that he came to the meeting with fairly well-thought out ideas as to what he desired in the graphics. The following differences were experienced in these meetings as to the two subject areas represented.

1. Teaching examples had been thought out in greater detail in the case of Engineering, so that communication was easier.

2. It was easier because the Electrical Engineers have a standardized graphic code for much of their content. Also, there was greater

difficulty in communicating with the Theatre Arts instructor because of semantic differences and the problem of converting words to suitable graphics symbols when no standard symbols existed.

3. In addition, the graphics problems posed in the two situations were different in that the transparencies requested for Theatre Arts were of more generalized information and hence more difficult to symbolize.

When the point of actual materials production had been reached, the process in regard to the contact time required by production staff with the instructor was much the same as had been experienced formerly. This contact time is due to the agreement that is required between artist and instructor as far as technical questions are concerned. For example, Engineering would send over the content for a transparency. This would contain some Engineering symbols which were unfamiliar to the artist. He would have to check with the instructor to be certain that his rendition of the symbols was correct.

In a situation such as Theatre Arts where the symbols are not a standardized part of the "language" of the field, much more interaction between instructor and artist was required.

In both cases, a film production specialist was also involved in production activities. The experiences here were similar to those with the graphics specialist. The film production activity with Theatre Arts resulted in a much more complex, time-consuming, and more costly production for several reasons.

1. Certain suggestions by the film production specialist caused the instructor to change some of the objectives.

2. These changes demanded more instructor-specialist time in order to re-design certain elements of the film requested.

3. The Engineering instructors wanted the films completed for use during the fall term; whereas, the Theatre Arts instructors were willing to wait for a later completion date and allow for a more thorough design phase.

Since film production is a more costly venture, the producer is especially concerned with having a clear understanding of the objectives of the instructor and the instructional techniques normally used in the course. Hence, the producer is more apt to want to delve rather deeply into the content and behavioral objectives that have been established. While it may at first have seemed to us that much of the ground that had been covered by the media specialist was being gone over again by the film producer, the degree of certainty and depth of thinking on the part of these instructors as to their objectives was such that much less time was actually required to ascertain this information than was normally experienced in previous cases.

One other audiovisual specialist was involved in the process. This was the distribution specialist. In addition to providing projection equipment and technicians as needed for the actual utilization of the materials in the classroom, he had to provide equipment and instruction for the professor,

so that he could practice with those pieces of equipment with which he was unfamiliar. This involved more time in the case of Engineering, because a student response system was introduced into the classroom routine as well as an overhead projector.

Because of the volume of new materials used by the Engineering instructors there was not enough time allowed for as thorough a utilization of the response system as was anticipated in earlier stages of planning. The preparation of materials to be used with the response system required a great deal of instructor time.

Tentative Conclusions

1. The work of the evaluation specialist, instructional specialist, and media specialist, with the instructor in determining objectives, teaching examples, and media, reduce the amount of instructor-production specialist contact time, as compared to an estimate of what would otherwise have been required.

2. In order to further reduce this interaction time, it will be necessary to devise an adequate graphic code both in the content field concerned and a standardized overall code for better communication between media specialist and production specialist and between the latter and artists or technicians.

3. Media decisions that are made currently are based largely upon the experience, "expert opinion", of the specialists, rather than upon any theory that is well grounded on research. This is not to say that no principles, theory, or research exists for the field,

but rather to indicate that much more research is needed in order to establish a clearly defined rationale for most of the media decisions that must be made in cases such as those discussed in these papers.

4. When new procedures such as we have proposed are to be used by a group of existing specialists, these persons should receive very explicit instruction in the use of the procedures; otherwise, they will tend to perform as they have in previous situations.

5. The procedures devised thus far will relieve the production specialist from much curriculum planning activity and allow him to concentrate more on the creative design function for which he is uniquely suited.

6. These procedures do not seem to affect the work of the production staff nor the interaction required between instructor and these persons (as related to technical problems).

7. No decisions resulted from a general meeting of all the audiovisual specialists with the media specialist and the instructor prior to actual production.

8. The past experience of the production specialists with the opportunity to work on more than one problem with a given instructor, has indicated that as an instructor repeats the process, he is able to come to the consultation and design sessions better prepared and that the two can communicate much more readily -- with the result that the contact time required becomes progressively shorter. This indicates that the role of the curriculum development specialists is largely

an educational one and that the need for their presence is lessened as the instructor becomes more familiar with the procedures.

9. While the proposed procedures indicate a directional flow of decisions from objectives to teaching examples to media to production, it should be recognized that often an instructor is stimulated to consider revising his course as a result of seeing or hearing about some new materials or equipment. Thus, in certain cases, the initial approach to a Learning Resources Center may be, "how can this partic.lar medium be applied to my course".

APPENDIX

COMPONENTS OF THE IS DEVELOPMENTAL SYSTEM

INPUTS Provided By Undefined Resources System

Goals →
Students →
Equipment →
Research →
Finance →
Information →
Etc. →

IS Developmental System

Details of the system's operating procedures are shown in Appendix A-2.

A description of the organization of other components is depicted below.

→ **OUTPUT of the Developmental System**

Instructional System

Etc.

Learning Resources Center Coordinator

Each of the Sub-systems depicted here may be self-administered within its own confines. The coordinator directs the interaction of these sub-systems pertinent to the needs of the instructional system in the process of development.

Course Planning Specialists:
1. Instructional specialist
2. Evaluation specialist
3. Media specialist

Production Specialists:
1. Film producer
2. Graphics producer
3. Television producer
4. Programer

Materials Storage and Retrieval Specialists:
1. Librarian
2. AV resources librarian

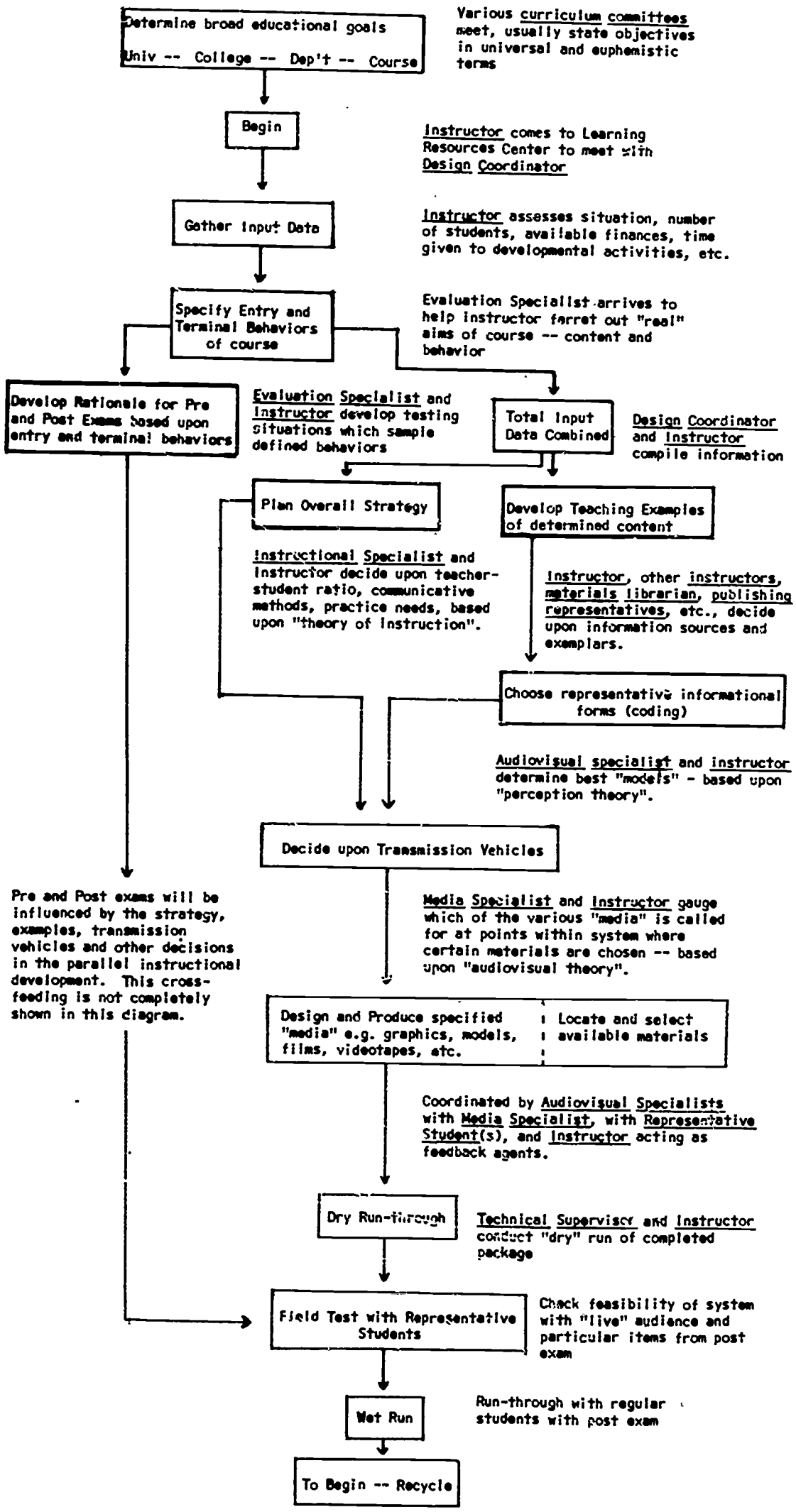
Distribution Specialists:
1. Technicians

Instructional Research Specialists

Systems Trial Personnel

A FLOW CHART OF TRIAL PROCEDURES FOR ANALYSIS AND DESIGN OF INSTRUCTIONAL SYSTEMS EMPLOYING INSTRUCTIONAL MEDIA

The following flow chart represents a hypothetical elaboration of the System Analysis, Design and Development phases of the "System Approach to Education Planning" (Ryans, 1964). Important: For purposes of simplicity, communication feedback loops are not illustrated in this flow chart. This information will be available in the symposium discussion.



AID TO IDENTIFICATION OF COURSE OBJECTIVES - Part 1

I. Actions - The following are an attempt and therefore, guide, to the categorization of student behaviors dealing with information. They hopefully form a hierarchy from simple to complex.

A. Recognition - To identify the correct alternative among a number of alternatives -- to discriminate.

1. Reorganize - To identify both parts and whole - to be aware of relations between the parts as well as their differences.

B. Recall - To retrieve information from memory given both simple and complex hints.

1. List - Recall both parts and the order among the parts.

C. Translate - Transfer given information into new code - paraphrase.

1. Condense - summarization - less words than original - cryptic - abstract.
2. Expand - to become redundant or enlarge upon original.

D. Infer - To draw solution from problem.

1. Deduce - reasoning from the general to the particular.
2. Induce - reasoning from the particular to the general.
3. Analyze - breaking a whole into its component parts.
4. Synthesize - building a whole from its component parts.
5. Evaluate - weighing a new object or situation in light of a given criteria.
6. Apply - using information in new situations.

E. Create - To produce a work of thought or imagination.

AID TO IDENTIFICATION OF COURSE OBJECTIVES - Part II

II. Levels of Content - Below are possible categories which lead to efficient breakdown of subject matter.

A. Associations - tying of a certain symbol to an object or situation. e.g. foreign language.

B. Concepts - a set of objects or events differing in physical appearance, defined as a class. e.g. "chair", "round", "courage".

C. Principles - If-then statements usually concerning two or more concepts. e.g. "If the temperature is raised, the pressure goes up."

D. Strategies - The chaining of principles - problem-solving activities. e.g. using the scientific method.

AID TO IDENTIFICATION OF COURSE OBJECTIVES - Part III

Content-Behavior Matrix

III. The combination of Parts I and II form a matrix which might lead to more efficient determination of course objectives.

ACTIONS	CONTENT: Association	Concepts	Principles	Strategies
Recognize Reorganize				
Recall List				
Translate Condense Expand				
Infer Deduce Induce Analyze Synthesize Evaluate Apply				
Create				

CONTENT - BEHAVIOR MATRIX

ACTION	CONTENT / ASSOCIATION	CONCEPTS	PRINCIPLES	STRATEGIES
RECOGNIZE REORGANIZE	Play Titles Authors Dates	Realism — Blocking Naturalism — Business Expressionism Impressionism Kinds of Contemporary Theatre	Realist took positive attitude and tried to provide solutions. Naturalism depicts life and its suffering with no solution. Expressionist tries to objectify life by using scenes, etc. Impressionism tend to elicit emotional reaction. Method - directorial principles design principles	
RECALL LIST	Historical Developments in the Physical Theatre.		Comedy - Domestic High - distinguished by verbal wit Farce - depends upon physical action	
TRANSLATE CONDENSE EXPAND		Apply concepts to - radio - television - contemporary Write essay or expand on types or styles.	Reduce theatre to a man and his environment.	
INFER DEDUCE INDUCE ANALYZE SYNTHESIZE EVALUATE APPLY	From knowledge of dates, infer development of theatre.	Analyze play in terms of elements of a style. Example - realism Structure - exposition, inciting action, building conflict, climax, resolution. Direction - interpretation. Acting - technique, movement.		Apply strategies to a production.
CREATE				Theme - what the author had in mind. Style - most film is realistic. - how to classify the comedy; give illustrations of type of comedy. Personal Evaluation - Overview of acting - Direction depends on camera and editing.

BEHAVIORAL GOALS OF INTRODUCTION TO THEATRE

Critically Analyze and Evaluate Various Forms of Entertainment

Critically Analyze and Evaluate a Play or Production

Critically Analyze and Evaluate Other Forms of Present-Day Entertainment

Critically Evaluate Acting

1. Conventions of Acting (Physical)
   a. Position
   b. Movement
   c. Voice
      1) Pitch
      2) Variability

ETC.

Critically Evaluate Direction

This evaluation depends upon the evaluation of acting, style, and execution of all integral parts of a production, since the director is the responsible person.

ETC.

Critically Analyze Style of a Play

1. Literary style
   a. Author's view of reality
   b. Length of play
   * c. Language - imagery used
   * d. Characters used in play - type and number
   e. Where does play begin? (plot revelation)
   f. Where is climax?
   g. Type of plot - simple-complicated
   h. Time, place, action unities

ETC.

Critically Analyze Form of a Play

1. Tragedy
   a. What did author intend?
   b. How is the nature of man approached? (characterization)
   c. Historical aspects - social, economic, etc. conditions that led to type of play
   d. Format of play
      1) number of acts
      2) music

ETC.

Critically Analyze Dramatic Criticism

1. Historical development
   a. Greek -Aristotle
   b. Renaissance
   c. etc.

ETC.

Analyze Theatre Architecture

1. Historical development
   a. Greek
   b. Shakespeare
   c. Proscenium

ETC.

Deduce the role of Radio in present Day Entertainment

Critically Analyze and Evaluate Television Productions

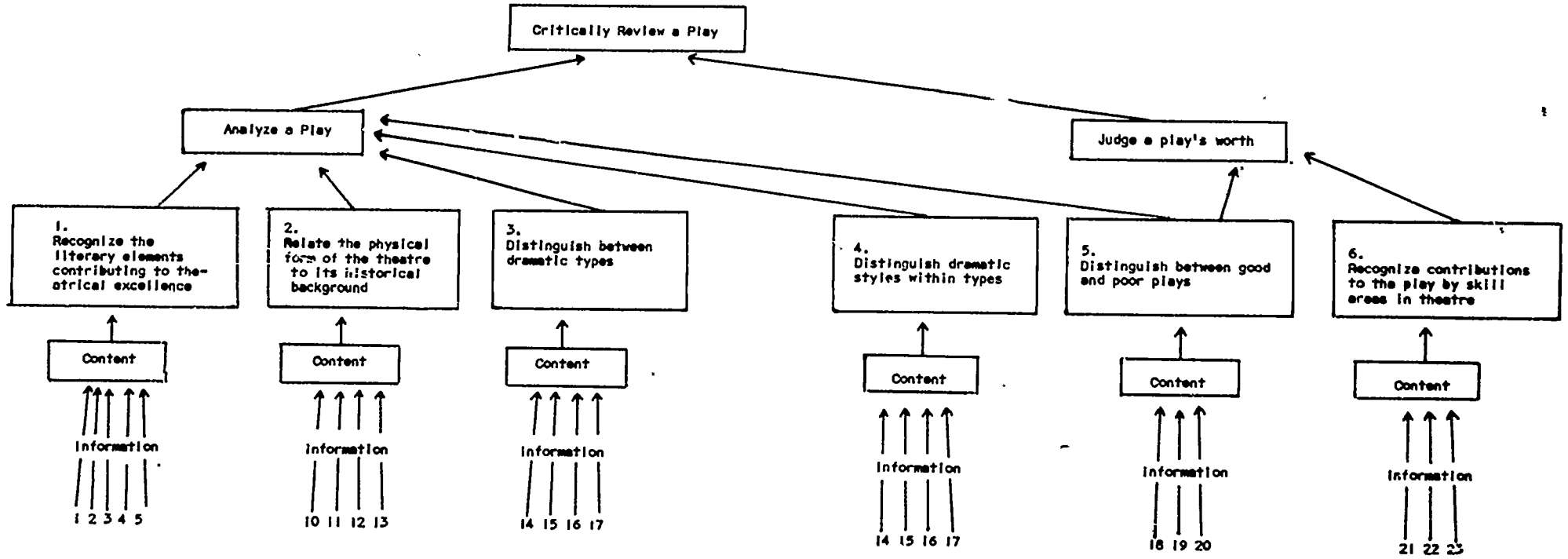
Using same Criteria as for Plays or Productions

Critically Evaluate Movies

APPENDIX B - 3

DESIGN FOR RELATING CONTENT TO BEHAVIORAL ANALYSIS

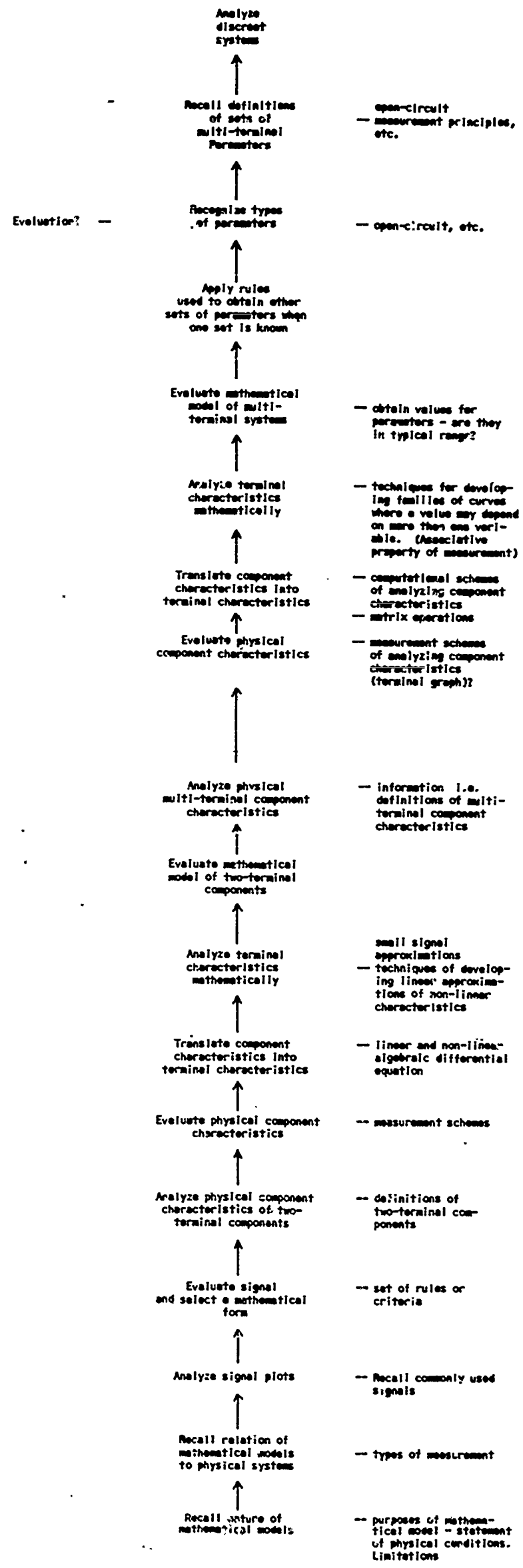
I. TERMINAL BEHAVIOR:



II. Evaluate the end product of a performing art by an universal standard which allows for different media presentations.

BEHAVIOR ANALYSIS

ELECTRICAL ENGINEERING
Professor and Educationist
Analyst Encounter



THEATRE ARTS
Professor and Instructional Specialist Encounter

CONTENT AND INSTRUCTIONAL PROCEDURES ANALYSIS FORM

Time Allotment	Content Outline	Present	Preferred	Available	Suggested	Production Needs
1st Hr.	General introduction - Course req.	LC	LC			
2nd Hr.	What is Drama: Chronology of dramatic form Evolution from ritual 1. Primitive need to control environment and understand universe Step to impersonation Conflict element Vicarious enlargement of life through observation	LC	LC - plus FS or S Show primitive rituals from various areas Watusi - Bear dance? Emp. mimetic function of participants in increasing degree of sophistication. Show vicarious function of newspapers, books, drama. Emphasize conflict Animation? Puppets? Newsreel clips -			
Etc.						
8-9th Hr.	Musical Comedy (Pal Joey, King and I) History of Musical Comedy Leading figures Modern developments	LC, DR, TR	LC, TR, and 16 mm.	TR of old and new recordings James Cagney - George M. Cohan - Jeanette MacDonald & Nelson Eddy - Pal Joey - Guys and Dolls - Pajama Game	Same - plus film clips of old musicals	
10th Hr.	Absurdist Drama Definition Function of Author Debt to expressionism	LC	LC and 16 mm.	Film of absurdist drama?	Film of Absurdist production.	2x2 slides on sketches of stages
11th Hr. 12th Hr.	Dramatic Criticism " " Implication of scientific thought	LC				
13th Hr.	Form of Theatre - Architecture	LC & S	LC, S, [illegible], 1,2,3	Showing ground plans of theatres through various periods of drama -- would have to be through conference w/ instructor.		

Symbol Key:

CCTV - Closed Circuit TV	OHT - Overhead transparency
CH - Chart	OHT - 1,2,3, etc. Overhead transperency with 1,2,3, or more overlays
DI - Group Discussion	
DR - Disc recording	
FB - Felt Board	OP - Opaque projection
FS - Filmstrip	PI - Programed instruction
LC - Lecture	S - 2x2 slides
LD - Live demonstration	TR - Tape recording
MO - Model or mockup	8mm - 8 millimeter film
MP - Motion Picture	16mm - 16 millimeter film

APPENDIX C - 1

TYPES OF INSTRUCTIONAL MATERIALS

Textbooks.

Reference books

Periodicals

Programed Instruction

16 mm films

8 mm films

Filmstrips

2x2 slides

3¼ x 4 slides

(Overhead transparencies)

Audio tapes

Disc recordings

Video tapes.

Charts

Flat pictures

Models

Specimens

Flannel cut-outs

TYPES OF EQUIPMENT NEEDED TO USE INSTRUCTIONAL MATERIALS

16 mm Projector

8 mm Projector *

2x2 slide Projector

3¼ x 4 slide Projector

Overhead Projector

Opaque Projector

Filmstrip Projector

Video Projector

Projection Screens

TV Receiver

Teaching Machines

Audio Tape Recorder and Playback

Video Tape Recorder & Playback

Record Player

Flannel Board

Microphone and P.A. System

Student Response System

* A variety of types are available based upon the form of the material (i.e. roll, cartridge, cartridge with magnetic sound, etc.).

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THE USE OF A SPECIALIST'S MODEL IN ANALYZING INSTRUCTIONAL PROBLEMS

A symposium discussion on the functions of the media specialist presented at the Convention of the Department of Audiovisual Instruction of the N.E.A.

Milwaukee, Wisconsin
April 29, 1965

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THE USE OF A SPECIALIST'S MODEL IN ANALYZING INSTRUCTIONAL PROBLEMS

Introduction

Speakers of this symposium regard this year's convention theme, "The Media Specialist - Agent and Object of Change," as a good theme for th: presentation, also. The reputation, workers in this field have gained from stimulating innovation and change in the instructional methods of educators has come under the scrutiny of recent studies, which probe the bases for audiovisual instructional methods. It is apparent that some overhaul of our concepts and roles in media planning and production may be timely and necessary. However, this task is not an easy one and involves consulting principles underlying human learning.

Some of these perspectives have been gained from experiences involved in a broad two-year United States Office of Education supported investigation at Michigan State University, titled "A Procedural and Cost Analysis Study of Media in Instructional Systems Development, Michigan State University, 1963-1965."

The Study has four stated purposes: (1) to do a descriptive analysis and evaluation of instructional development activities at Michigan State University, during the period 1963-1965; (2) to devise methods of measuring costs associated with instructional systems development and to develop principles of sound budgetary planning for the use of educational media in university instruction; (3) to develop hypothetical models of instructional systems development procedures and their relative costs; (4) to prepare descriptive reports of the above materials for use by other institutions of higher learning

concerned with the application of technology to instructional programs.

The experiences obtained in developing hypothetical models for instructional systems development included identifying the roles of the various specialists, including a role of particular interest to this conference -- the media specialist.

The work of the various specialists prescribed in the models will be described in the symposium discussion.

The general plan followed in this presentation is (1) to identify a logical sequence of major decisions and a division of labor among specialists involved in instructional systems development; (2) to focus attention on the bases for decisions in which the media specialist participates; (3) to analyze the problems associated with the translation of resulting media decisions into actual instructional materials, and (4) to explore the means for motivating faculty to undertake instructional innovation utilizing the newer media.

CONCEPTUALIZING THE ROLES OF THE EVALUATION AND INSTRUCTIONAL SPECIALISTS

The conceptual scheme or flow-chart that we have devised is based upon the hypothetical activities of a media specialist in instructional system, or course development. (See Appendix A-1 for outline and Appendix A-2 for more detailed version.) These activities call for a number of competencies, some within, and others not within, the usual media specialist's repertoire. By singling out these separate competencies, we have been able to differentiate those activities which are the normal province of the media specialist and those which could be given over to other specialists. The final outcome was what might be thought of as standard operating procedures for a learning resources center.

The skeleton flow-chart prepared for this presentation, outlines the major decision areas (See Appendix A-1). We have attempted to delineate specialty areas in our model to represent the optimal situation. It could very well be a one-man job. The first box represents the public relations activity that one does to get the instructor to the door. This topic has received too much attention already. The next function is primarily diagnostic, determining the input information, and the scope of the problem. A media generalist trained in interview techniques could handle the routing of each customer to the appropriate specialists within the Center.

We have given the objective-defining task to the evaluation experts. Their difficult mission is to help the instructor clarify his goals in a form which is specific enough for test item writing. It should be pointed out that

these objectives, when defined, represent only the intermediate level. The production specialist further along the line asks for much more detail specific to those sections of the course under production.

For those who have no evaluation experts, we have added some guidelines for objective defining.

1. Start where instructor is conversant; search out logic of content.
2. Compare with psychological logic of content (usually the way the instructor learned it).
3. Start with most complex goal and work back to entry knowledge and skills.
4. Work in the abstract -- speak of concepts and principles, not teaching examples of same.
5. If instructor can't explain it, have him do it himself.
6. Distinguish between mastery and discriminating objectives.
7. Have instructor weight or rank most important objectives.
8. Accentuate the content; then add the behaviors. It's much easier for the instructor.

Unfortunately, we are now, thanks to new emphasis on behavior statements, learning how to specify these tasks. I say, unfortunately, because we have little idea as to how to go about reaching them. The great "open sesame" that educators have dreamed about, that is, wait until the objectives are finally spelled out, is pure myth. Instead of finding the gold and riches in terms of easily identifiable instructional strategy and media specification, we now have had to face that awful truth, that we have little idea of how to develop instructional conditions to meet these specified objectives.

The next box represents the beginning of the domain of the instructional specialist. His major activity is to continue to complete the instructional flow-chart, the logical and psychological sequence of the total course. (Two examples are found in the Appendix: B-4 and B-5.) This is no mean task, but leads to the spelling out of one of the major variables concerned with effective

instruction -- that of sequence.

The selection of communicative patterns, or better known as the Trump plan decisions, is next. Unfortunately again, there are few cues within the information gathered that leads to suggesting programing, large or small classes, etc. In most cases, either the instructor has a "pet method", or some logistic restriction determines the final choices.

Some guidelines for suggesting strategies are:

1. The more complex cognitive objectives call for interaction during issues discussion; feedback on problem-solving tasks.
2. The more difficult a concept, the more likely the need for adjunct programing.
3. One-way information should be in printed form whenever possible, so students can attack it at their rate, not the instructors.
4. Instructor is needed when one-way information is undergoing rapid change rendering printed forms obsolete.
5. Student-to-student interaction should only be allowed when pre-requisite information has been learned.

The instructor comes into his own when the choice of concurrent information within each pattern is decided. It's his discipline. It is also his task to generate teaching examples. This is the creative act. It might well be that a specially inventive man within each discipline be singled out to help in this vastly important task. The best choice of media still can't overcome choosing an inadequate example.

At this point we are ready to consider the form and transmittor of the selected examples. Again, we are much in the dark regarding the general operating rules when given certain specified teaching example informational requirements. The remaining papers discuss these problems.

Summary:

A brief analysis of the extremely complex interaction between instructor and consultants has been offered. It is hoped that it has brought about some conceptual clarity and that the added guidelines will be helpful. We've a long way to go before we can begin making decisions based on something more substantial than "experience".

MAKING THE MEDIA SPECIALIST MORE SPECIAL

The foregoing description of a specialist-based model for instructional system development prescribes a more restricted decision area for the media specialist than is typically observed by today's range of audiovisual workers. This restriction of decisions, imposed on the media specialist, is aimed at both improving his professional skills and better defining the intermediate or functional principles with which he operates. In addition, the designers perceive the usefulness of experience-based media decisions as a source for statements of functional principles, which set the media specialist apart as unique or special.

The statement of functional principles should not be confused with the search for basic scientific principles, generally considered operative in communication and psychology of learning. These more basic questions are studied by scientists, who seek empirical truths in terms only remotely identified with any given application. As used here, functional principles might be described as generalized statements of successful practice, partially or fully supported by basic scientific principles.

The balance of this symposium discussion examines the possibilities of formulating functional principles for use by audiovisual personnel who, in making decisions to keep "media shops" ticking from day to day, find need for a more explicit rationale on what makes their products "tick".

Admittedly, preoccupation with purely media selection decisions is a luxury seldom allowed audiovisual workers. Presently, they are expected to

advise on a broad spectrum of problems, ranging from abstract aspects of communication theory to routine inventory maintenance of graphic arts materials.

This diversity of job content makes it difficult to extract media selection decisions unless tasks can be generalized. Some progress is being made toward this goal by the audiovisual field in the recent DAVI position papers, and other analyses of media specialist functions in media selection, production, and general management problems.

The identification problem is also complicated by certain binding decision restrictions, such as financial resources. For instance, there is at times such preoccupation with the low distribution costs associated with television that its lack of viewer feedback capabilities is overlooked.

What sources of functional principles are presently available to guide media specialists? There appear to be two potential sources of guidelines the media specialist probably can review prior to advising the selection of any given representational form or transmission means. These sources are, (1) principles derived from the findings of basic research in psychology of learning and communications, and (2) the problems of media production or utilization; put simply, "the hard facts of life".

The present range of experiences of media specialists indicates unequal influence on decisions is exerted by each set of guidelines. Perforce, a majority of the decisions are made in accord with the "facts of life" restrictions, often in contradiction to some finding in psychological research.

This observation should not reflect negatively on the operating procedures of media specialists as of this date. The complexities and contingencies

associated with teaching situations and learners make it improbable that media decisions will ever be based on scientific principles of communication or learning, even if these are isolated. Most likely, decisions will stem from intermediate media principles linking basic findings to application problems.

Currently, the instructional media decisions lean heavily on an intuitive connection the media specialist is able to make with his knowledge of research findings. Making a valid connection consistently constitutes an accomplishment to which many media specialists aspire. Success here is achieved sporadically by most media specialists, and more often by some than others. Increasing the probability of consistently making effective media decisions is handicapped by a shortage of, (1) basic research findings general enough to transfer to functional situations, and (2) well-articulated standard operating procedures for applying the reliable measures we now have. These observations have been made before in the audiovisual field, but appear to be the conclusions elsewhere as well. For instance, Krathwohl (8) states:

> We do not have enough psychological knowledge for the teacher and the developer of instructional materials to move with certainty from an intermediate-level objective to a single set of very detailed and concrete objectives. . . . Both the instructional material specialist and the teacher precede the psychologist into an area of most-needed research. They must make choices while the psychologist is still developing the knowledge to help them.

The attention psychologists are giving the instructional media area is probably most completely summarized by Travers (12) in a current U.S.O.E. study. The conclusions of that investigation seriously question the psychological soundness and "theory" underlying current recommended practices in the

audiovisual field. This comprehensive, if somewhat scathing, analysis compares commonly employed audiovisual generalizations with certain psychological and communications research studies. Here too, though, we are cautioned on the promise eventual breakthroughs in basic research may hold for the on-the-job decisions of media specialists:

> This (i.e. analysis of conditions affecting the learning process) does not mean that the work of the psychologist is directly applicable to the solution of problems faced by the audiovisual expert; for the psychologist, in the tradition of experimental science, studies phenomena in highly simplified situations. The problem of generalizing from these restricted and simplified situations to the complex situations of daily life is one faced by every scientific area. (12:1.23)

The potentially limited usefulness of basic research is repeated later in the same report and an observation is made with regard to media specialists:

> This notable point of contact between the audiovisual area and the area of psychological research may represent a point of departure for extended research related to the design of audiovisual devices. (12:1.24)

The "point of departure" reference made above should have special significance for those concerned with defining the media specialist role. It suggests that the audiovisual field concentrate its energies in an area of "intermediate level" research. A plan for such action is briefly described as follows.

This plan generally aims to locate functional media principles by collating detailed descriptions of the rationale consistently employed by successful media specialists. This kind of an effort would involve several stages and perhaps more agreement among individuals than anyone has a right to expect. However, since a consensus is sought for descriptive, not prescriptive,

purposes, it may be feasible. The investigation proposed would involve first devising a model depicting the standard sequence of media development procedures. Secondly, specific statements of media decision rationale from media specialists would be solicited on the basis of the standard model and then consolidated, using a standard language for the field. To this end, some new taxonomy might be developed, or perhaps one already in existence could be employed. The third stage would consist largely of feedback or dissemination of findings for field testing by practicioners and the further consideration of basic researchers.

In an unwieldly way, the DAVI Convention represents such an operation. However, the diffuse model here that binds us, gets little chance to weld the knowledge of such an assembly in a mere week.

The search for a theoretical structure to support the media specialist role, deserves increased scrutiny and investigation, and soon, if the promise of this role is to be fully realized.

Summarizing this portion of the discussion, it was pointed out that the media specialist role as it is presently practiced, attempts to cope with far too broad decision areas. When he is confined to purely instructional media selection decisions, there is little basic research to provide reliable guidance. In the absence of counter arguments, the hard practicalities of cost and production tend to prevail in media decisions. It is suggested, as an interim step, to establish a functional instructional media theory, through a consolidation of statements describing current successful media selection and use practice.

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FUNCTIONAL FACTORS IN MEDIA SELECTION

The assertion has just been made that the decisions concerning the selection of media are primarily decided on utility or functional bases. This is especially so since we are deficient in theory and principles that we can apply directly from learning psychology and communications to the use of media in instruction. Even if we had the theory and knew how to translate it into recommendations for the selection of media, we would still be faced with many restrictions which always exist. What are these restrictions and how do they affect the role of the media specialist? They can be categorized into the following groups:

1) What restrictions are imposed by the physical characteristics of the instructional space provided?
2) What technical services are available in terms of equipment and personnel?
3) What costs will be involved for rental, purchase, production, or experimentation (including time of instructor and specialists)?
4) What existing materials are available which are suitable and what will they cost? (This means locating the source and usually obtaining the materials for examination (and perhaps even for try out).)
5) Where the desired materials do not exist, how can they be produced and what will be the production time required? (Costs already mentioned in 3)

Note that these restrictions have been stated in the form of questions. The media specialist possesses the knowledge necessary to provide the information

that is demanded by these questions. Possession of this knowledge is one of the competencies which make him "special".

In brief, this "functional knowledge" consists of the requirements, in terms of facilities, that are imposed by each kind of audiovisual equipment. Also included are the technician assistance that may be required and the costs involved in determining the materials that are available and production of media.

In addition, the media specialist has other kinds of "special" information that he can provide, which is also of a "functional" nature. I refer to this as audiovisual knowledge. It includes:

1) The relative advantages and characteristics of the different forms of instructional materials.
2) The technical problems encountered n using various materials and audiovisual equipment.
3) Techniques for effective utilization of instructional materials.

Thus far, we have referred to three sets of information that bear upon decisions that have to be made in order to select media for instruction. In brief, these have been, (1) the principles from psychology and communications; (2) the restrictions that exist in a given situation, and (3) the knowledge we have gained, collectively and individually, through the use of audiovisual materials and equipment.

All of this information is greatly to be desired in order to make better media decisions. However, lest you get the impression that these decisions will now become simple, it should be recognized that another important ingredient

exists. It is the value system of the individuals who will make the media decisions. In a great many cases, there will be alternatives to consider. Indeed, it is a major thesis of this "systems analysis" approach to instructional development that through the efforts and knowledge of several specialists, more alternatives will be presented for consideration. Each alternative will offer the attainment of certain objectives (with some attached probability) and cost. Immediately, questions arise such as -- which objectives are most important? Which is valued most, teacher time, student time, or dollars? In such areas, per nal judgment will always play an important role. In these cases, personal judgment also enters very largely in the assignment of the probabilities just mentioned. (At least until such time as media research can provide this kind of probabilistic data)

We have asserted that the expertise of the media specialist (in the context of the foregoing specialist's model) lies in his knowledge of the three kinds of information just discussed and hopefully in his ability to bridge the gap that exists between theory and application.

I would add another benefit that is derived from this type of instructional development. In the system just described, the media specialist receives a rather well-thought-out plan consisting of objectives, examples, and strategy. This permits him to consider the media alternatives, not just in terms of each bit of information or example, but also in terms of the entire course. This over-all look can result in different recommendations than he would make if he were being consulted on a small part of the course.

In conclusion, I would re-emphasize an earlier statement, which indicated that there is need for a taxonomy in the field. The earlier reference was in

regard to obtaining statements of rationale from media specialists. In our Study, we found that such a need also exists in the communications between media specialist and production specialist, especially if the process is to become more efficient. Also, we found that the efforts of the intervening specialists (evaluation, instruction, and media) did not serve to reduce the time that the production personnel were required to spend conferring with the instructor; conferring over matters of correctness of detail, approval of design, more detailed specification of objectives and other production considerations. The work that the other specialists performed with the instructor in terms of objectives, evaluation, content, examples, and media form, did save considerable production specialist time. Formerly, he would have tried to perform all of these roles, and hence would not have had as much of his own time left for production efforts. Also, it is doubtful that as thorough a consideration of the gross objectives and strategy would have been achieved by the production specialist.

Not only is there a division of labor achieved by this system, but there is the advantage of having two or more media persons involved, which could result in the availability of more information and more creative suggestions being made.

INSTRUCTIONAL SYSTEMS DEVELOPMENT AT THE MICHIGAN STATE UNIVERSITY AUDIOVISUAL CENTER

At Michigan State, media design in instructional systems development is the concern of several instructional media agencies, including the Audiovisual Center, the Closed-Circuit Television Department, and the University Radio and Television Broadcasting services.

The MSU Audiovisual Center, founded in 1952 at the request of faculty members and directed since then by Charles F. Schuller, has recognized the importance of proper sequence in instructional development activities. A new section of the Center, designated as the Instructional Systems Development Division, concentrates on those phases of the University educational development program which emphasize learning, curriculum analysis, evaluation, and appropriate use of media. In addition, its media specialists often work as catalysts to bring about warranted change. The primary objective is to assist in developing instructional programs which will provide effective educational opportunities for unprecedented numbers of MSU students.

The activities which comprise the interests of the Instructional Systems Development Division range from introducing media technical advances to assisting in developing instructional strategy. Action areas include: (a) planning for optimum instruction facility, including media equipment and physical setting; (b) conferring, organizing, and scheduling specialists needed to reach decisions regarding sequence and content, experience of students, media treatment, and evaluation procedures; (c) locating, procuring, and organizing of available instructional material previously specified; and (d) planning and producing original instructional materials prescribed by the logistics.

The Division is involved, either directly or indirectly, in most of the instructional activities on campus. The degree of involvement depends largely upon the nature of the problem. For example, the Instructional Media Space Provisions project, initiated by the Office of the Provost in 1963, included equipping all large classrooms with appropriate media facilities and assigning student technicians to assist the professors instructing the ten larger space areas. Each quarter some forty departments and eighty professors benefit from the student and technician service. Many more departments benefit from the permanently assigned equipment in other classrooms. The professors involved, quickly recognized the value and enthusiastically praised the project. Requests continue to be made for similar services in other large classrooms. Funds have been granted for placement of student technicians in two additional classrooms next fall.

Audiovisual Center media specialist involvement in instructional development activity, is by invitation. Request for media assistance may come from the Office of the Educational Development Program (EDP) Director, a dean, a department head and/or a professor(s). Departmental committees charged with a specific curriculum development task frequently include a media specialist in their membership. The problems presented may begin and end with production or facility; they may involve media specifications for instructional space in building planning; or they may result in a complete revamping of a course. Although the number of current involvements is too large to treat each one, a few projects should be reviewed to indicate the nature of the activity.

The Anatomy Department, which relies most exclusively on the individual student-microscope method of teaching microscopic anatomy and which is faced with mushrooming enrollment and an inadequacy of space and equipment, presented

a proposed solution to the Director of EDP. After discussing media treatment and costs with Audiovisual personnel, the Department submitted a request for, and was granted, the necessary funds needed in producing a master set of two hundred fifty 2" x 2" color slides. One hundred duplicate sets and an equal number of 10" x 10" rear projection units will be available at all times, enabling students to work at their own pace. Production of the slides and procurement of the equipment are in progress.

The Chemistry Department had a similar problem of increased enrollment and inadequate space. The numbers to be accommodated in the laboratory were becoming so crucial that the department considered introducing non-laboratory, theory-oriented classes for freshmen. Instead, a series of ten-minute color films were produced by the Film Department of the Audiovisual Center. The films, completed in the summer of 1964, enable the Department to handle twice the number of previous classes, by alternating students between laboratory and screening room.

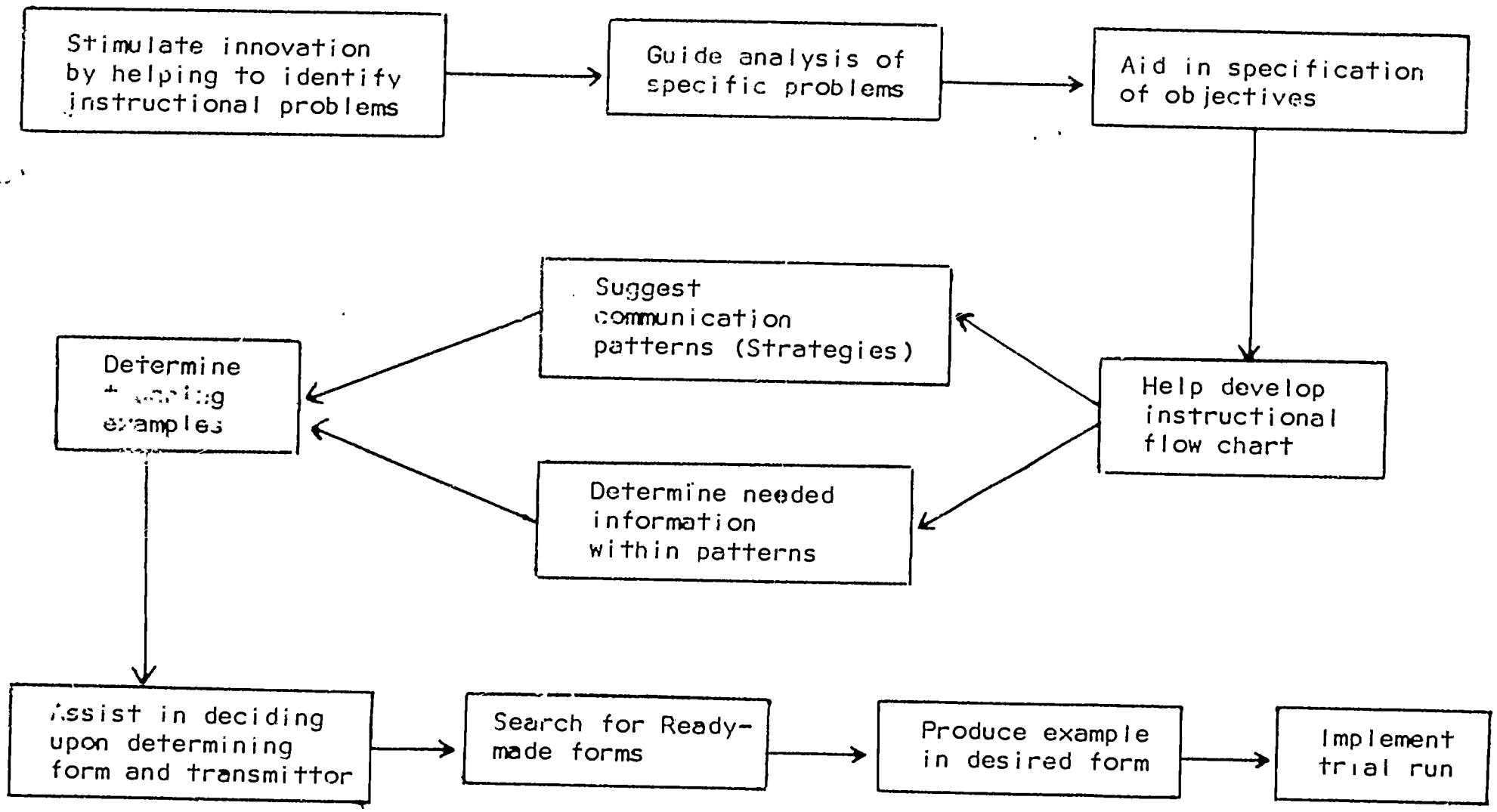
The two cases (Anatomy and Chemistry) represent total departmental faculty involvement. Dr. Al Stinson of Anatomy and Dr. Carl Brubaker, Jr. of Chemistry, served as coordinators of the respective projects. Media specialists were involved in the planning phase and continued to consult and advise through the completion phase.

A few of the other instructional development activities involving the Audiovisual Center are listed as follows: The College of Social Science (Dr. Geoffrey Moore) set up an equipment saturation study in Fee Hall to determine the degree to which convenient access to an "equipment pool", staffed from 8:00 a.m. to 5:00 p.m. by a student technician, would effect the use rate

of media; the College of Home Economics (Professor Jean McFadden), the Department of Landscape Architecture (Dr. Dean Glick), the Department of Electrical Engineering (Dr. Harry Hedges), and the Department of Theatre Arts (Dr. E. C. Reynolds), are applying instructional systems development procedures in programming their courses, employing a variety of media. The Department of Physics (Dr. Thomas Edwards) programmed a basic course employing some two hundred special overhead transparencies, numerous 8mm single concept films and 16mm educational films, making it possible to effectively teach large groups of students.

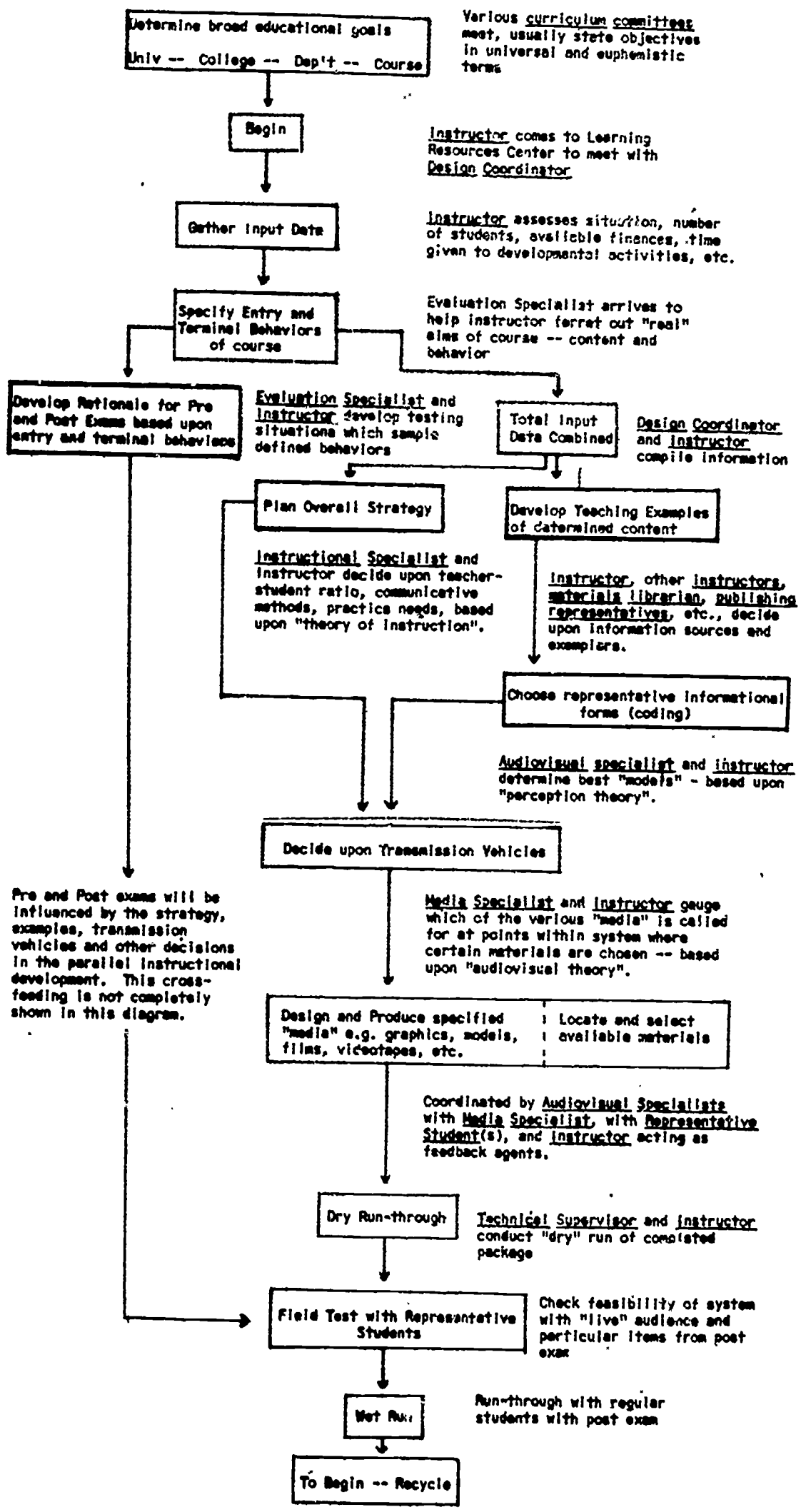
The Instructional Systems Development Division of the Michigan State University Audiovisual Center will continue to seek and use new knowledge. This goal is pursued through changes in current Center services and operations; a special two-year Study mentioned earlier, analyzing the successful instructional development cases; and designing more comprehensive analyses in future developments. It is our hope that the developmental system can be sufficiently refined to reliably aid the faculty in the selection, production, and use of appropriate instructional resources in all areas.

SIMPLIFIED DEVELOPMENTAL SYSTEM FLOW CHART



A FLOW CHART OF TRIAL PROCEDURES FOR ANALYSIS AND DESIGN OF INSTRUCTIONAL SYSTEMS EMPLOYING INSTRUCTIONAL MEDIA

The following flow chart represents a hypothetical elaboration of the System Analysis, Design and Development phases of the "System Approach to Education Planning" (Ryans, 1964). Important: For purposes of simplicity, communication feedback loops are not illustrated in this flow chart. This information will be available in the symposium discussion.

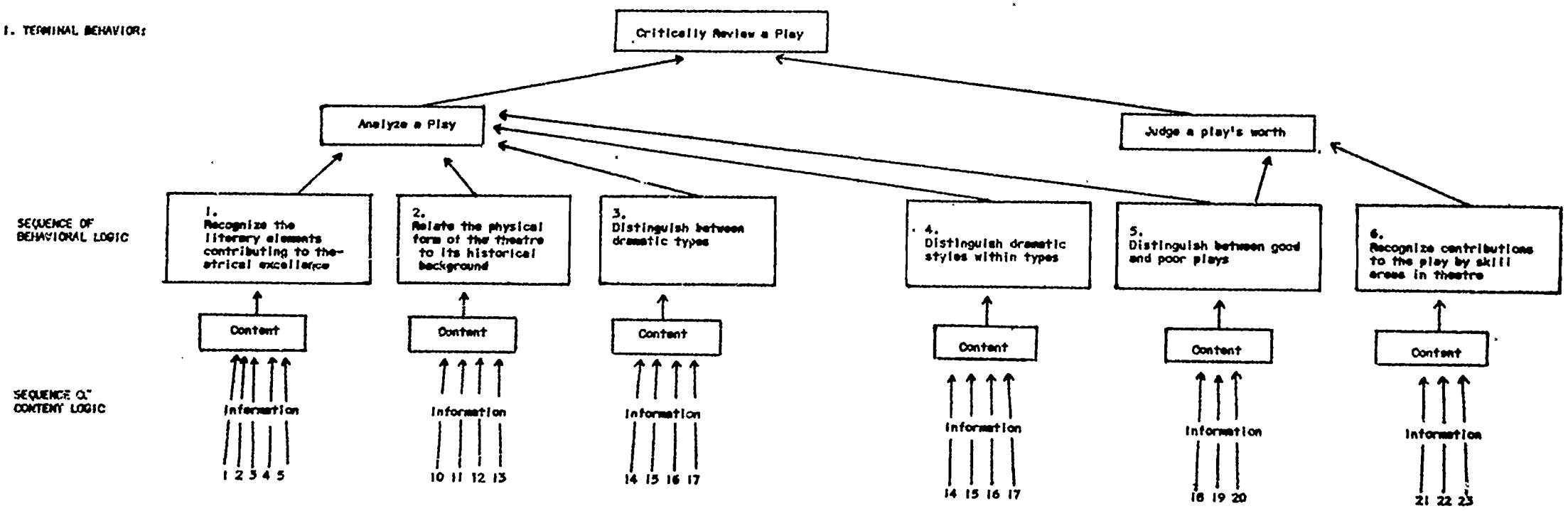


APPENDIX B - 4

THEATRE ARTS
Professor - Instructional Specialist Encounter

DESIGN FOR RELATING CONTENT TO BEHAVIORAL ANALYSIS

I. TERMINAL BEHAVIOR:



II. Evaluate the end product of a performing art by an universal standard which allows for different media presentations.

BEHAVIOR ANALYSIS

ELECTRICAL ENGINEERING
Professor and Educationist
Analyst Encounter

Evaluation? —

Analyze discreet systems

Recall definitions of sets of multi-terminal Parameters — open-circuit — measurement principles, etc.

Recognize types of parameters — open-circuit, etc.

Apply rules used to obtain other sets of parameters when one set is known

Evaluate mathematical model of multi-terminal systems — obtain values for parameters - are they in typical range?

Analyze terminal characteristics mathematically — techniques for developing families of curves where a value may depend on more than one variable. (Associative property of measurement)

Translate component characteristics into terminal characteristics — computational schemes of analyzing component characteristics — matrix operations

Evaluate physical component characteristics — measurement schemes of analyzing component characteristics (terminal graph)?

Analyze physical multi-terminal component characteristics — information i.e. definitions of multi-terminal component characteristics

Evaluate mathematical model of two-terminal components

Analyze terminal characteristics mathematically — small signal approximations — techniques of developing linear approximations of non-linear characteristics

Translate component characteristics into terminal characteristics — linear and non-linear algebraic differential equation

Evaluate physical component characteristics — measurement schemes

Analyze physical component characteristics of two-terminal components — definitions of two-terminal components

Evaluate signal and select a mathematical form — set of rules or criteria

Analyze signal plots — Recall commonly used signals

Recall relation of mathematical models to physical systems — types of measurement

Recall nature of mathematical models — purposes of mathematical model - statement of physical conditions. Limitations

ANALYSING INSTRUCTIONAL PROBLEMS

(A symposium at the 1965 DAVI Milwaukee Convention, April 29)

presented by John Barson, Director, and Horace C. Hartsell, W. Russell Hornbaker, John M. Gordon, Jr., Specialists, Instructional Systems Development Study, Michigan State University;

reported by Phil Lange, Teachers College, Columbia University

Implicit in most of the thinking and writing about "instructional systems" are these assumptions:

a. A "system" has a specific product.

b. Certain actions must be taken and functions performed so as to produce the product.

c. The organization of the system is such that it exercises a degree of quality control: the functions are kept in operational balance at a specified level of productivity.

d. The process of system development involves almost continuous appraisal so as to be sure that the system works and the product is up to date: this means feedback and modification, tryout and adjustment, concern for a better product and for higher standards of productivity.

Thus instructional systems have characteristics which make them predictable and researchable. The system is an adaptive form of problem solving.

When the teacher(s) or professor(s) must plan and teach a new course there is indeed a practical instructional problem. We know how often in actual practice very little time, resource, and support is provided an instructor for the analyzing, detailed planning, the constructing, organizing, and preliminary tryout of an instructional plan. Sometimes it is merely a directive: "Joe, next year your schedule is changed; you will teach the third-year course." But what does happen when conscientious teachers are given support in analyzing and planning instruction? What should happen? Are there guide lines for this developmental process? What are the functions of the media specialists? In the Instructional Systems Development Study (funded by an NDEA grant) at Michigan State University, Director Barson and his associates Gordon, Hartsell and Hornbaker have been studying such questions.

Instructional Systems Development Division at MSU

As part of their afternoon symposium* the Michigan State University team included a description of the Instructional Systems Development Division as it operates on the East Lansing campus. This Division is a new section of the MSU Audiovisual Center. The Instructional Systems Development Division concentrates on those phases of MSU's educational development program which emphasize learning, curriculum analysis, evaluation, and appropriate use of media. In addition, its media specialists often work as catalysts to bring about warranted change. The primary objective is to assist in developing instructional programs which will provide effective educational opportunities for unprecedented numbers of MSU college students. The Division's activities range from introducing media technical advances to developing instructional strategy.

NDEA grant to study instructional systems development

One major activity of the Division is a two-year USOE-supported investigation of the place or media and media specialization in instructional systems development at MSU. This study has four purposes: (1) to do a descriptive analysis and evaluation of instructional development activities at MSU during the period 1963-1965; (2) to devise methods of measuring costs associated with instructional systems development and to develop principles of sound budgetary planning for the use of educational media in university instruction; (3) to develop hypothetical models of instructional systems development procedures and their relative costs; (4) to prepare descriptive reports of the above materials for use by other institutions of higher learning concerned with the application of technology to instructional programs.

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* April 29, 1965, at the DAVI Convention in Milwaukee, the MSU team spoke at the 2 pm symposium entitled ANALYZING INSTRUCTIONAL PROBLEMS.

Sharing some insights

Although the Study and its report will not be completed for some time, the MSU researchers have been giving attention to the roles of various specialists as they appear in the hypothetical models for instructional systems development. In reporting some of their experiences, the MSU team evidenced several strong feelings about the advantages to educators from careful and detailed analysis and system development of instruction. For one thing, it reveals amazingly (amazing even to experienced planners) the extreme complexity and interdependence of the decisions, conditions and personal qualities that are essential to give substance, process, design and evidence of learning in any instructional plan.

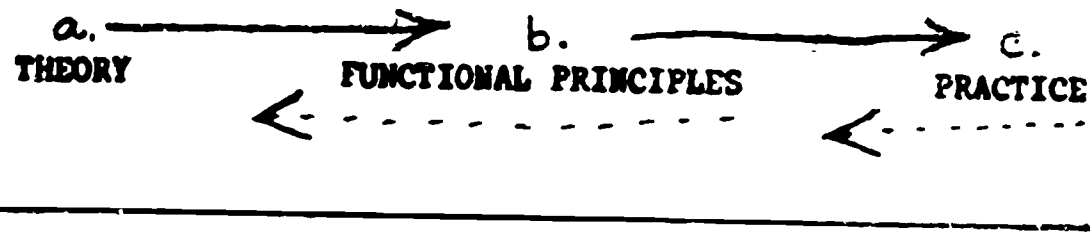
There is nothing easy about the analysis and development of an instructional system. For example, it is an illusion to assume that once the "behavioral objectives" have been spelled out thereafter everything easily falls into place. The truth of the matter makes the analyzers face up squarely to the fact that objectives are not easily described as observable behaviors so as to permit suitable evaluation; and moreover even when behavioral goals are clearly identifiable we usually have little idea of how to develop instructional conditions to elicit the behaviors to gain the specified objectives. In short, the analyzing and pre-planning stage of instructional development warrants attention and investment it seldom gets.

For greater effectiveness and efficiency in our instructional programs, we must give more energy to studying better ways of unravelling and predicting the complexities in planning instruction. As indicated in Figure 1, an idealized way of explaining relationships is to have THEORY (a) from which are deduced FUNCTIONAL PRINCIPLES (b) which can be translated into applications and proven to be workable in actual PRACTICE (c).

Ideally we like to see a clear relationship from THEORY to the deduction of FUNCTIONAL PRINCIPLES to a translation into applications that provide workable proof

in actual PRACTICE, as indicated by the solid line in Figure 1. But it is the hunch of the MSU group that the revelation of principles and subsequently the overarching theory is revealed only by systematic penetration of the confusion of practice (as indicated by the dotted line in Figure 1). As an instrument for probing into practices, on the way to uncovering principles, the MSU researchers developed flow charts of the practical decision-making process.

Figure 1



Developmental Flow Chart of Logical Decisions in Instructional Programming

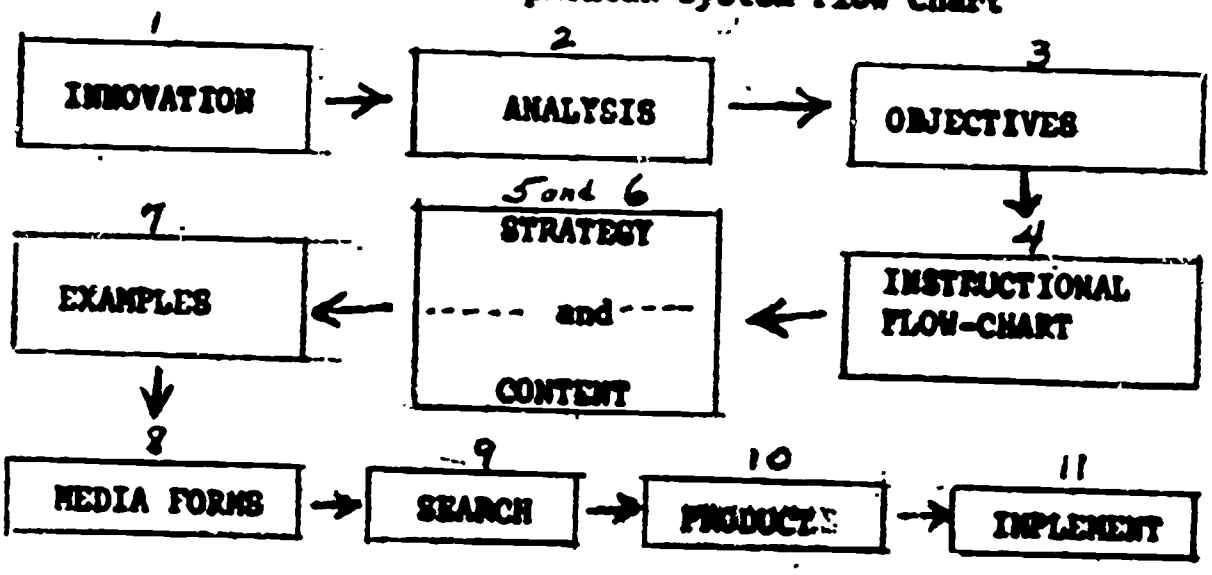
What can be learned from the development of a flow chart to conceptualize and guide the analyses of the activities of a media specialist in the development of instruction? What are the major areas of decision making in instructional planning? What seems to be a logical sequence for these major decisions? What kinds of specialization are needed for each decision area? What is a reasonable division of labor among the team of specialists (or within an individual with a multiplicity of specializations)? Where does the media specialist fit in? What are some problems associated with the translation of the media decisions into actual, accessible instructional materials and utilization strategies?

In Figure 2 is a generalized flow chart which the MSU group has used to give order to these questions. It identifies eleven areas of major decision: INNOVATION (1) involves helping the educator or instructor to see new possibilities and identify instructional problems. Guided ANALYSIS (2) is directed at the explosion of specific problems, followed by attention and assistance in the

specification of OBJECTIVES (3). The development of an INSTRUCTIONAL FLOW CHART (4) impressed the need for ordering or sequencing. This leads to decisions on STRATEGY AND CONTENT (5-6). STRATEGIES suggest the communication patterns; and CONTENT decisions determine the needed information within patterns. Obviously these are different but overlapping areas of decision-making. Then there must be a determination of the EXAMPLES (7) of teaching -- what the teaching-learning activity really will be. The areas of decision-making labelled MEDIA FORMS (8), SEARCH (9), PRODUCE (10) and IMPLEMENT (11) in this flow chart have direct significance for the media specialist for they bear directly on communication and mediation. There are the media decisions about the FORM AND SYSTEM for transmission or communication, the SEARCH for ready-made and available forms and systems, the PRODUCTION of examples in desired form, and the IMPLEMENTATION or try-out of the unity of the instruction and possible improvement through the benefit of trial runs.

Figure 2

Simplified Developmental System Flow Chart



The "Media specialist"

The media specialist brings three kinds of "special" information or knowledge to the decision areas:

1) The relative advantages and characteristics of the different forms of instructional materials.

2) The technical problems encountered in using various materials and audiovisual equipment.

3) Techniques for effective utilization of instructional materials.

For example, the audiovisual specialist has a "functional knowledge" about the requirements, in terms of facilities, that are imposed by each kind of audiovisual equipment. Also included are the technician assistance that may be required and the costs involved in determining the materials that are available and production of media.

As a member of a team the media specialist may be very much involved in activities on the flow chart at 1, 2, 4, 8, 9, 10, 11. The evaluation specialists may have leadership along with curriculum specialists in 3. In 4 and STRATEGY the educational psychologist has a needed specialization; while in CONTENT AND EXAMPLES, the instructor comes "into his own." (The experienced instructor is usually already rich with content and examples in his domain)

Some hunches and guide lines

Here are some of the guide lines the MSU group have been using when it comes to filling in this flow chart with the actual details of specific instance of instructional planning (with the intent of improving that planning).

On defining objectives (see area 3 in the flow chart):

1. Start where instructor is conversant; search out logic of content.

2. Compare with psychological logic of content (usually the way the instructor learned it).

3. Start with most complex goal and work back to entry knowledge and skills.

4. Work in the abstract — speak of concepts and principles, not teaching examples of same.

5. If instructor can't explain it, have him do it himself.

6. Distinguish between mastery and discriminating objectives.

7. Have instructor weight or rank most important objectives.

8. Accentuate the content; then add the behaviors. It's much easier for the instructor.

On suggesting strategies (see areas 5 and 6 in the flow chart):

1. The more complex cognitive objectives call for interaction during issues discussion feedback on problem solving tasks.

2. The more difficult a concept, the more likely the need for adjunct programing.

3. One-way information should be in printed form whenever possible, so students can attack it at their rate, not the instructors.

4. Instructor is needed when one-way information is undergoing rapid change rendering printed forms obsolete.

5. Student-to-student interaction should only be allowed when pre-requisite information has been learned.

On restrictions and the role of the media specialist. What are perceived as the restrictions, and what can the media specialist do about the restrictions themselves and the perception of them:

1) What restrictions are imposed by the physical characteristics of the instructional space provided? (What can the media specialist do to assess, interpret, and alter them?)

2) What technical services are available in terms of equipment and personnel? (Who has what degree of control for accessibility?)

3) What costs will be involved for rental, purchase, production or experimentation (including time of instructor and specialists)?

4) What existing materials are available which are suitable and what will they cost? (This means locating the source and usually obtaining the materials for examination and perhaps even for try out.)

5) Where the desired materials do not exist, how can they be produced and what will be the production time required?

The need to change

In general "... the media specialist role as it is presently practiced attempts to cope with far too broad decision areas. When the media specialist is confined to purely instructional media selection decisions, there is little basic research to provide reliable guidance. In the absence of counter arguments, the hard practicalities of cost and production tend to prevail in media decisions. It is suggested, as an interim step, to establish a functional instructional media theory, through a consolidation of statements describing current successful media selection and use practice."

The MSU group noted that the more they became aware of the ingredients of instructional planning the more room they saw for improvement, and the greater did they feel the need for further systematic study to hasten the urgently needed support for improved instructional planning and the more effective use of specialization in solving instructional problems.