THE RELATIONSHIP OF FACULTY CONTENT SPECIALITY TO INSTRUCTIONAL DEVELOPMENT ACTIVITIES AND THE SUBJECT MATTER RELATEDNESS OF PRESENTATIONS DESIGNED TO ENCOURAGE FURTHER USAGE

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ABSTRACT

THE RELATIONSHIP OF FACULTY CONTENT SPECIALTY
TO INSTRUCTIONAL DEVELOPMENT ACTIVITIES
AND THE SUBJECT MATTER RELATEDNESS
OF PRESENTATIONS DESIGNED TO
ENCOURAGE FURTHER USAGE

By

Curtis John McCarty

A major function of the educational media specialist's job is to act as a change agent in the educational setting. His is the performance of a communication linkage relationship between the knowledge generators and the knowledge users; to that end he is responsible for innovation to be brought to the attention of the users in such a way that the recipient will want to adopt the information.

Such a position is currently being created and is given much attention at many institutions. It is called Instructional Development. It stems largely from a belief that institutions must provide specific functional units for the implementation of planned change in response to the overwhelming demand by students, staff and the administration itself.

Since several interpretations have been given to the position of Instructional Development, it has come to have three components from as many disciplines. They are instruction, curriculum and innovation.

Two basic notions are reflected. One is the systematic approach to the analysis of a process and the second suggests that the outcome of the process should be improved learning.

The increased emphasis during the past ten years on instructional systems provided the background and impetus for a study of the relationship of media and the instructional systems development process. Subsequent analysis and comparisons have led to suggestions in the literature that guidelines or heuristics tie together the elements of an instructional developmental model. An important and fundamental notion advanced from previous research was selected by the researcher for testing and analysis, proposed by the members of the research team and tested at four major universities.

The particular heuristic in question which prompted the current study is: "Don't let subject matter interfere with an understanding of process." The heuristic advises the professor of mediated instruction to choose his examples outside the content area of the person to whom he is demonstrating a technique for possible adoption.

It was hypothesized that discipline-centered, positively-oriented-to-change faculty members would make more

commitments to adopt when presented with a non-discipline-related message than when presented with a discipline-related message.

Thus, an experiment was undertaken whereby a population of discipline-centered faculty members who were predisposed to change were presented with one of these message treatments, either related or non-related or control. The innovation used was compressed speech. Subsequent analysis of variance across the experimental groups and analysis of the instrument across both the experimental and discipline groups indicated no statistical differences existed between the groups.

There were four major variables that contributed to the no difference results. Population selection, message treatment, reliability and the underlying assumptions of the instrument and the nature of the instructional development process are the conditions seen to be the major sources of random variability.

Recommendations included larger sample populations, increased reliability values for the testing instrument and an experimental procedure which would include informal and formal communication assessments. Further study of the experimental hypothesis is suggested.

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CHAPTER I

RATIONALE FOR THE INVESTIGATION

Purpose of and Need for the Study

The purpose of this study is to determine which of two message strategies will obtain more adoption commitments decisions by discipline centered faculty members who are positively oriented to change.

One of the prime responsibilities of a person charged with the responsibility of coordinating media services and implementing their use within educational systems is that of making educators aware of the potential of the media and securing a commitment from them to utilize the available media in their instruction.

A major function of the educational media specialist's job is to act as a change agent in the educational setting. His is the performance of a communication linkage[1] relationship between the knowledge generators and the knowledge users; to that end he is responsible for

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[1]Communication linkage is a term used and suggested by Rogers and Jain meaning the performance of the function of communicating client needs to researchers and of diffusing innovations to clients. See Everett M. Rogers and Nemi C. Jain, "Research Utilization: Bridging the Communication Gap Between Science and Practice" (paper presented at the Joint Session of the Information Systems Division of the International Communication Association and the Behavioral Sciences Interest Group of the Speech Association of America, New York, December 27-30, 1969), pp. 4-9.

innovation to be brought to the attention of the users in such a way that the recipient will want to adopt the information.

However, media specialists' efforts are not as consistently successful as they might be. One way this problem might be looked at is from the position of one who must be concerned with the process of social change. One paradigm useful to the discussion is that suggested by Rogers[2] (see Figure 1).

Recognition of the Need for Change	Origin of the New Idea	
	Internal to be Social System	External to the Social System
Internal to the Social System	I. IMMANENT CHANGE	II. SELECTIVE CONTACT CHANGE
External to the Social System	III. MOTIVATED IMMAMENT CHANGE (Unlikely)	IV. DIRECTED CONTACT CHANGE

Fig. 1.--Paradigm of types of social change.

The media professional traditionally is perceived as a peripheral, if not external, member of the educational system of a given school.[3] In many cases, he perceives the need for a change but is unable to implement it. When

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[2]Everett M. Rogers in association with Lynne Svenning, Modernization Among Peasants: The Impact of Communication (New York: Holt, Rinehart and Winston, Inc., 1969), p. 6.

[3]Paul W. F. Witt, "Educational Technology: The Education of Teachers and the Development of Instructional Materials Specialists," in Technology and the Curriculum, ed. by Paul W. F. Witt (New York: Teachers College Press, 1968), pp. 53-67.

the idea itself comes from the outside, the paradigm indicates a condition of directed contact (or planned) change. Goodlad comments that these external forces and interests have in the main been responsible for motivating the schools toward change more rapidly in recent years than in the past.[4]

Planned change however, has a negative connotation to many. It is seen as the manipulation of peoples' ideas in a controlled fashion such as suggested in George Orwell's 1984.[5] A perceived need is therefore suggested by Rogers for a buffer position to be occupied by a person who can perform the delicate relationship of intermediary between the innovation source and the change agent or media specialist.[6]

Such a position is currently being created and, as such, is given much attention at many institutions. It is called Instructional Development. It stems largely from a belief that institutions must provide specific functional

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[4]John I. Goodlad, Renata Von Stoephasius, and M. Frances Klein, The Changing School Curriculum (New York: Fund for the Advancement of Education, Ford Foundation, 1966), pp. 12-14.

[5]George Orwell, 1984 (New York: The New American Library of World Literature, Inc., Harcourt, Brace and Co., 1949).

[6]Everett M. Rogers, "Developing a Strategy for Planned Change" (paper presented at the Symposium on the Application of System Analysis and Management Techniques to Educational Planning in California, Orange, Calif., June 12-13, 1967. East Lansing, Mich.: Department of Communication, Michigan State University), p. 8.

units for the implementation of planned change in response to the overwhelming demand by students, staff and the administration itself. Johnson[7] states the problem well.

> The pressure is on. Students are coming in hordes and their numbers are increasing. Costs are rising sharply and taxpayers are demanding efficiency--and in some situations threatening revolt. The times in which we live urgently demand imaginative thinking, planning and action.

Nature of the Inquiry

Since several interpretations have been given to the position of Instructional Development, it has come to have three components from as many disciplines. They are instruction, curriculum and innovation.

The position as defined by several different institutions of higher education reflects slightly differing emphases. At Michigan State University, Johnson,[8] reflecting the Educational Development Project administratively states its purpose at an economic level.

> Educational development is the planned use . . . of free floating dollars to support projects for seeking answers to the questions and improving the academic program of the university.

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[7] B. Lamar Johnson, "Action and Reaction: A Conference Critique" (paper presented at the National Conference on Curricular and Instructional Innovation in Large Colleges and Universities, held at Michigan State University, East Lansing, Mich., Nov. 6-11, 1966), p. 6.

[8] F. Craig Johnson, An Evaluation of Educational Development Programs in Higher Education, Project Report No. 401 (East Lansing, Mich.: Michigan State University, Office of the Provost, March, 1968), p. 2.

The Department of Instructional Development and Technology, representing the academic responsibility, defines the process more operationally when Schuller[9] states:

> The purpose of . . . Instructional Development . . . is to prepare educators and to develop the additional competencies required to assist educational systems desiring to improve the quality and effectiveness of their instructional programs.

Ely and Hudspeth[10] of Syracuse University emphasize the systematic and continuous developmental process of both individual faculty member and the learning task.

> Instructional development activity . . . represents a systematic attempt to use creatively the new educational technology. Present . . . development activities are seen as a continuum ranging from individual instructor improvement through systematically developed learning sequences.

Writing for Indiana University, Faris[11] defines the process around the development of instruction.

> The emphasis . . . should be upon development of instruction . . . that . . . could be feasibly achieved by following a systematic plan or approach.

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[9]Charles F. Schuller, Professional Programs in Instructional Development and Technology (East Lansing, Mich.: College of Education, Michigan State University, 1968), p. 1.

[10]Don Ely and DeLayne R. Hudspeth, "Instructional Development: Syracuse University, Syracuse, New York," in New Media and College Teaching, ed. by James W. Thornton, Jr. and James W. Brown (Washington, D. C.: National Education Association, 1968), p. 125.

[11]Gene Faris, Terminal Program Report: Institute in Educational Media: Indiana University (Bloomington, Ind.: Instructional Development Institute, Audio-Visual Center, May 31, 1968), p. 1.

Two basic notions are consistent as reflected by the previous examples. One is the systematic approach to the analysis of a process and the second suggests that the outcome of the approach should be improved, i.e., greater learning. Miller[12] and Trzebiatowski[13] point to similar systematic principles which not only evaluate current instructional programs but also implement suggested improvements in the curriculum.

Curriculum development is slightly more global in its approach but less specific in its solutions. Thelen[14] suggests that:

> . . . it will be the body responsible . . . for formulating, revising, and disseminating the . . . long range plans for educational development.

Another interpretation of curriculum development and change procedure is the bringing about through adoption of instructional improvements in packaged form. Goodlad[15] supports this notion.

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[12]Elwood E. Miller, "A Descriptive Study, Evaluation and Analysis of Instructional Systems Development Activities in Selected Departments at MSU During the Period of 1960 to 1963" (unpublished Ph. D. dissertation, Michigan State University, 1964), pp. 50-60.

[13]Gregory L. Trzebiatowski, "An Evaluation of the Instructional Systems Approach in Higher Education" (unpublished Ph. D. dissertation, Michigan State University, 1967), pp. 35-49.

[14]Herbert A. Thelen, Education and the Human Quest (New York: Harper and Row, 1960), pp. 202-204.

[15]Goodlad, Von Stoephasius, and Klein, op. cit., pp. 12-14.

> In virtually every field the focal point for teachers and students alike is an instructional materials package; invariably a textbook or series of textbooks, supplementary books, workbooks, teacher's manuals, film strips, films, programed materials and lab experiments.

Anderson[16] likewise relates curriculum improvement with change. He emphasizes however, the interaction of change with the people involved.

> To those who thoughtfully ponder the question, improvement means change: up-dating content, rewriting textbooks, doing research on learning and child growth . . . re-educating teachers. . . .

Berlo[17] makes the point quite clear when he suggests to the instructional media specialist that the emphasis of the specialist should be on the people served.

> You are not in the audiovisual business, you are not in the instructional technology business, you are not in the message or media business. You are in the people business. You are paid to affect behavior, to produce information-gain, to induce attitude-change, and, most importantly, to increase the learner's ability to learn without being taught.

The effects of a lack of curriculum emphasis on the people to be served is poignantly demonstrated by Hicks.[18]

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[16]Vernon E. Anderson, Principles and Procedures of Curriculum Improvement (2nd ed.; New York: The Ronald Press Co., 1965), pp. 3-19.

[17]David K. Berlo, "Communication Theory and Audiovisual Education," Keynote Address to the National Convention of the Department of Audiovisual Instruction, National Education Association, Audiovisual Instruction, June, 1963, p. 374.

[18]Hanne Lane Hicks, "The Invisible Curriculum," Phi Delta Kappan, 10 (June 1969), 602.

> The children are exposed to flexible scheduling, programed instruction, team teaching. They are socialized in kindergarten, institutionalized in grade school, and homogenized in high school. And they are graduated, too often, unchanged, untouched and uncaring.

Of final importance to the discussion at this point is the notion of innovation or the deliberate attempt on the part of an individual to introduce, in a systematic way, an idea into a social group for their ultimate adoption. The behavioral outcome is for the innovation to be given serious consideration by the intended group and measured against current practices for possible replacement in the operating structure, or to be discarded as non-functioning.

Instructional development and/or curriculum improvement have as their purposes the reformation of existing practices into a position where they can be subjected to scrutiny of analysis and possible inclusion into the observed behavioral traits of the reference group.

The Committee for Economic Development[19] in a 1968 report has seen fit to place innovation on the priority list for new directions.

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[19]Committee For Economic Development, Innovation in Education : New Directions For the American School, Sterling M. McMurrin, project director (New York: Committee For Economic Development, 1968), p. 14.

> The future of the schools depends in large part on whether they can overcome in educational policy and practice what is frequently an extreme conservatism and a strong resistance to change. This depends in turn on whether they can develop a genuine openness to experiment and innovation. . . .

Lieberman,[20] however, states that the impetus for educational reforms must belong to the professional educator rather than the concerned non-professional.

> . . . but the major and enduring responsibility for improving our schools lies with the people who work in them.

Goodlad[21] supports this view when he specifies current curriculum reform procedures.

> The current curriculum reform movement is marked by an updating of content, a reorganization of subject matter, and some fresh approaches to methodology in fields traditionally taught in the schools.

In addition, Lippitt[22] points out that ultimately it is the individual teacher, the professional, who must decide on the relative merit of any given curriculum innovation.

> In order for the materials to be useful, the teacher must perceive the information as relevant . . . and must be able to derive from it realistic ideas about possible action.

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[20] Myron Lieberman, The Future of Public Education, Phoenix Books (Chicago and London: The University of Chicago Press, 1960), p. 218.

[21] Goodlad, Von Stoephasius, and Klein, op. cit., pp. 12-14.

[22] Ronald Lippitt, Robert Fox, and Richard Schmuck, "Innovating Classroom Practices to Support Achievement Motivation and Ego Development," in Behavioral Frontiers in Education, ed. by Eli M. Bower and William G. Hollister (New York: John Wiley & Sons, Inc., 1967), p. 322.

At a 1966 conference on curricular innovation at Michigan State University, Rogers[23] states that the problems of today were created in part by the process by which the large universities evolved from their small origins, i.e., the informational explosion in its most literal sense.

> But in the 1960's conditions began to change, what with further growth in instructional technology, shifting societal expectations for the university, and students with different needs and capabilities. But the institutionalized bureaucracy could not respond quickly to its changing environment.

It is seen, therefore, that the basic instructional development model as previously outlined has, as its components, the three discipline interrelationships of instruction, curriculum and innovation.

Research Question

The increased emphasis during the past ten years on instructional systems provided the background and impetus for Barson's 1965 study of the relationship of media and the instructional systems development process.[24] This study was followed by a federal project comparing

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[23]Everett M. Rogers, "The Communication of Innovations: Strategies for Change in a Complex Institution" (paper presented at the National Conference on Curricular and Instructional Innovation for Large Colleges and Universities, Michigan State University, East Lansing, Mich., Nov. 6-11, 1966), p. 2.

[24]John Barson, A Procedural and Cost Analysis Study of Media in Instructional Systems Development (Washington, D.C.: U. S. Department of Health, Education and Welfare, Contract OE-3-16-030, September, 1965), pp. 1-10.

instructional systems development activities across four major universities.[25] Barson's analysis and comparisons led his research team to suggest guidelines or heuristics that would tie together the elements of the instructional development model proposed by the members of the research team and tested at four major universities.[26]

A heuristic is defined as anything which serves to guide to discover or to reveal. As stated by Haney, the heuristic is a second cousin to the research hypothesis.[27] However, the heuristic is valuable in that it can point the way to a hypothetical statement and subsequent empirical verification. The report encourages hypothesis generation from heuristics.

The particular heuristic in question which prompts this current study is: "Don't let subject matter interfere with an understanding of process."[28] According to the team of authors, this statement advises the professor of mediated instruction to choose his examples outside the content area of the person to whom he is demonstrating a

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[25]John Barson, Instructional Systems Development: A Demonstration and Evaluation Project (Washington, D. C.: U. S. Department of Health, Education and Welfare, Contract OE-5-16-025, June, 1967), pp. 1-14, 52-67.

[26]Ibid., p. 84.

[27]John B. Haney, Phil C. Lange, and John Barson, "The Heuristic Dimension of Instructional Development," Audio Visual Communication Review, 16 (Winter, 1968), 368.

[28]Barson, Instructional Systems Development: . . ., op. cit., p. 80.

technique for possible adoption. If it is advisable to demonstrate the concept of programming to a professor of economics, don't show him an economics program. Rather, demonstrate the technique with a program outside his area of expertise. Otherwise he will take intellectual issue with the content in the program and miss the salient features of the concept of programming.

This heuristic, if valid, would provide a useful strategy to the media change agent to secure the adoption decision from the prospective educator client. The projected implications of the heuristic do appear to be in direct conflict with one aspect of the current body of innovation research; the essence of which states that the speed or rate of adoption of a given innovation is increased if it can be perceived as advantageous, compatible, easily tried, uncomplicated and observable.[29] (This area of innovation research is more thoroughly reviewed in Chapter II under The Communication Message.) If however, the experimental evidence supports the alternative hypothesis of Barson's heuristic, then the study can be justified on the basis of providing a very vital innovation strategy to the instructional development specialist.

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[29]Rogers, "The Communication of Innovations: . . .," op. cit., p. 4.

Statement of the Hypothesis

The broadly stated hypothesis to be subjected to test suggests that the probability of innovation adoption commitments by faculty members from the specific disciplines of Mathematics, Geology and Biology will be increased when the content of an innovation presentation involving an instructional process is other than from the discipline of the specific faculty member to whom the presentation is made.

The innovation itself is introduced to the faculty member as one component part of the instructional development process. It is this component, i.e., message relatedness, that is to be studied in this research.

Methodology

This study is to be an experimental study concerned with the presumed relationship between subject matter content of a faculty member and the relatedness of messages designed to secure his commitment to adopt an innovation concerning an instructional process.

The experimental design is a modified Posttest Only-Control Group[30] and will draw a sample of subjects from a population composed of teachers from the Science-Math Institute for High School Teachers held on the Michigan

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[30]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi Experimental Designs for Research (Chicago: Rand McNally & Co., 1963), pp. 6-27.

State University campus during the summer of 1969. A visual representation of the design is shown in Figure 2.

Subjects	Message Treatment	Assignment	Treatment	Observation
Biology	Related	Random	X	O
	Non-Related	Random	X	O
Earth Science	Related	Random	X	O
	Non-Related	Random	X	O
Mathematics	Related	Random	X	O
	Non-Related	Random	X	O
Control		Random	X	O

Fig. 2.--Representation of design.

In order to avoid possible sources of media bias, the presentation technique used will be compressed speech. Audio tapes were prepared in various forms for use as message sources.

A Likert-type scale was devised, refined through consultation with university evaluation and testing services, and subjected to limited pilot testing prior to the actual experiment. Items were designed to elicit responses of agreement or disagreement to forty statements dealing with media usage and intent to adopt. Demographic data were obtained as checks on the presumed underlying relationships. Random assignment was used throughout.

A controlled environment was obtained and used for this experiment for the purpose of reducing the time factor

since the subjects were released from their normal class activities during the hour of the experiment.

Data analysis, by computer, was performed and is discussed in Chapter IV.

Scope of the Study

Research literature on educational change agents is quite limited along the lines of the present research question. As such it is essential to draw upon the research traditions in other areas for much of the study. Suggestions for supportive and corollary research are made in the final chapter of this study.

The diffusion process as defined by Rogers is composed of several states, i.e., functional relationships consisting of first knowledge, attitude formation, decision and evaluation/confirmation.[31] While important to the overall value of diffusion research, which is quite extensive, these stages have been collapsed to first knowledge through attitude formation to confirmation in order that the process, which is usually conceived to occur over some time, may be studied within the time period of one hour which was available.

The application to the general body of diffusion research is restricted in that the adoption commitment was defined along very narrow lines.

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[31]Everett M. Rogers, Diffusion of Innovations, (Glencoe, N. Y.: The Free Press of Glencoe, N. Y., 1962), p. 81.

Finally, appropriate instrumentation was not found to exist. Therefore, the validity of the experimental instrument is assumed but should be presumed to be tentative until subjected to additional verification.

Definition of Terms

Several terms will be used throughout the research which will be defined and used in the following manner:

Innovation--An idea, technique, process or thing perceived as new by an individual.[32] In this case, the technique of using compressed audio materials.

Compressed Speech--The electromechanical process of varying the duration of a previously recorded audio signal without affecting its concommitant pitch. This procedure can be accomplished by using a machine designed specifically for this purpose.[33]

Diffusion Process--The presumed sequence by which an individual is made aware of an innovation by a change agent.

Change Agent--The professional, in this case the Instructional Development Specialist, who influences innovation decisions in a way seen as desirable by the client.[34]

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[32] Ibid., p. 13-28.

[33] Emerson Foulke, "Listening and Word Rate," Journal of Communication, 18, No. 3 (1969), 196.

[34] Rogers, Modernization Among Peasants: . . ., op. cit., p. 169.

Adoption Stages--The presumed sequence through which an individual passes from first awareness of an innovation to final adoption-decision commitment.[35]

Adoption Commitment--An individual's above the mean score on statements on the questionnaire form as distributed to the experimental population assumed to reflect an internal behavior state which will activate future adoption.

Instructional Development Process--Activities undertaken by the Instructional Development Specialist which include the systematic analysis and subsequent recommendations for any given instructional system.

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[35]Rogers, Diffusion of Innovations, op. cit., p. 76.

CHAPTER II

REVIEW OF THE LITERATURE

Review of Related Research

When the late Dr. James Finn in 1965 suggested the term Instructional Development and Technology,[1] he was reflecting a position which he thought would cope with the changing nature of a professional organization in future years. Slaughter,[2] characterizing our society, labels the phenomenon of change as the most indicative and accurate descriptor. McLuhan[3] supports the general inevitability of change adding that global and instantaneous transmission of information prohibits "relaxed" change. The positive value of change is called rewarding by Harmer[4] who realizes the practical consequences of

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[1]James D. Finn, "Instructional Technology," Audio Visual Instruction, 10, No. 3 (March, 1965), 192-94.

[2]Robert E. Slaughter, "The Response of the Knowledge Industry to Society's Demand For a More Relevant Education," in Technology and the Curriculum, ed. by Paul W. F. Witt (New York: Teachers College Press, 1968), p. 46.

[3]Marshall McLuhan, Understanding Media: The Extensions of Man, Signet Books (New York: The New American Library, McGraw-Hill, 1964), pp. 269-94.

[4]R. Howard Harmer, "Dare to Innovate," American Chamber of Commerce Magazine, September, 1969, pp. 18-23.

changes as breaks with tradition. Max Ways sums up the problem neatly in the following way:

> Within a decade or two it will be generally understood that the challenge to U. S. society will turn not around the production of goods but around the difficulties and opportunities involved in a world of accelerating change and ever widening choices. . . . What is different now is the pace of change, and the prospect that it will come faster and faster. . . .[5]

This concern for innovation and change is reflected at many levels. Finn[6] noting the official policy of the U. S. Office of Education states:

> It has become the official policy of the U. S. Office of Education to encourage educational innovations; further, the concept of innovation is 'in' with the entire educational community at State, regional, and local levels.

Further evidence of this trend has to do with most of the recently introduced innovations in the U. S. school systems. These represent the planned change strategy. Examples are the School Math Study Group, supported by NSF, Ford Foundation and the Rockefeller Foundation as is the Physical Science Study Committee and the Biological Sciences Curriculum Committee.[7]

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[5]Max Ways, "The Era of Radical Change," in Instructional Technology . . . A Book of Readings, ed. by Frederick G. Knirk and John W. Childs (New York: Holt, Rinehart and Winston, 1968), p. 4.

[6]James D. Finn, "The Emerging Technology of Education," in Instructional Process and Media Innovation, ed. by Robert A. Weisgerber (Chicago: Rand McNally & Co., 1968), p. 315.

[7]John I. Goodlad, School Curriculum Reform in the United States (New York: Fund for the Advancement of Education, Ford Foundation, 1964), pp. 13-28.

The Instructional System Development Project[8] noted this emphasis in the educational community when the authors stated that:

> It is common knowledge that growing student enrollments and the dearth of professorial talent have forced many colleges and universities to seek new ways of meeting instructional obligation . . . [thus] facilitating more effective ways of meeting growing instructional demands.

The preceding comments evidence the widely held belief and conviction among the educational community that strategies must be developed to cope with the process of change or innovation. Of special interest and concern is the task of making the faculty aware of current directions and objectives of the organization. Faculty time is taken up more and more with memos, the daily reading of newsletters, journals, periodicals, committee meetings, advanced study, final approval of the most recent publication, drafting a proposal for graduate research and, if time permits, teaching Introductory Methodology to 600 students twice a week. In recent years, however, institutions have partially realized the dilemma of meeting the needs of the the students and have encouraged the growth and development of instructional systems to alleviate some of the pressure on departments whose courses service large segments of the total university populations.

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[8]Barson, Instructional Systems Development: . . ., op. cit., p. 1.

Some of the instructional alternatives that have found their way into classrooms are instructional television, independent study materials, language laboratories, computers and a whole array of hard and soft wares becoming known as instructional technology.

However, a more systematic effort at dealing directly with the problems of instruction was directed at the organizational structure of the university itself. There was no clear cut procedure that was available to the members of the organization to solve basic instructional problems for small student groups. In addition, there was no consistent method or approach for problem solving of instructional situations.[9]

Utilizing existing services of the general university, specific agencies were established to systematically develop an overall strategy to approach the solving of instructional problems in higher education. The objectives of one such organization were to:

> . . . be devoted to the development and implementation of a set of educational principles and procedures . . . which will be developed . . . and which will preserve and improve . . . education.[10]

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[9]Charles F. Hoban "Implications of Theory for Research and Implementation in the New Educational Media," in Theory For the New Media in Education, ed. by John M. Parsey (East Lansing, Mich.: Educational Publication Services, Michigan State University, 1968), pp. 143-66.

[10]John E. Dietrich and F. Craig Johnson, "A Catalytic Agent for Innovation in Higher Education," reprinted from Educational Record (Washington, D. C.: American Council on Education, Summer, 1967), p. 209.

Its functions were organized around principles similar to those suggested by Brickell[11] who identified a three pronged attack for the mobilization of a state-wide approach to curriculum development; that is, design, evaluation and dissemination with the teacher at the focal point in the process.

Even though the function of a development and innovative organization within a university is established with specified objectives and purposes aimed at implementing change, additional difficulties arise.

Generalized resistance to change is exhibited in many ways; Vergis[12] found innappropriate selection of personnel as contributing to a resistant to change attitude. Miller[13] suggests that a credibility gap exists between faculty and graduate instructional development specialist. Cohen[14] cites group influence as a major factor in attitude change.

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[11]Henry M. Brickell, "State Organization for Educational Change: A Case Study and a Proposal," in Innovation in Education, ed. by Matthew B. Miles (New York: Teachers College Press, Columbia University, 1964), pp. 494-505.

[12]John P. Vergis, "Media Utilization in Select Colleges," Final Technical Report of an Institute funded under Title VI-B, Higher Education Act of 1965, University of Southern California, September, 1967 to August, 1968, pp. 10-12.

[13]Elwood E. Miller, "Improvement in Media Applications to Undergraduate Instruction with Coordinated Programs for Educational Media Specialists," Final Report of an Institute funded under Title VI-B, Higher Education Act of 1965, Michigan State University, September, 1967 to May, 1968, pp. 82-91.

[14]Arthur R. Cohen, Attitude Change and Social Influence (New York: Basic Books, Inc., 1964), pp. 100-120.

Hudspeth[15] suggests the nature of belief systems as predictors of resistance to change among faculty. Rogers[16] has shown that the characteristics of innovations themselves to be related to the resistance of an adoption. These factors must therefore be taken into consideration in developing a strategy for the implementation of educational innovations.

The role of the instructional development specialist appears to be straightforward. He must meet with the faculty member to discuss the characteristics of the available media resources as they relate to his developmental problem, sharply defining the objectives, making decisions to determine instructional strategies for implementation of the instructional system.[17] The components of this developmental model include the following:

I. The Instructional Development Specialist as Change Agent

II. The Faculty Member

A. Discipline Centered

B. Positively Oriented Toward Change

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[15]Delayne R. Hudspeth, "A Study of Belief Systems and Acceptance of New Education Media With Users and Non-users of AudioVisual Graphics" (unpublished Ph. D. dissertation, Michigan State University, 1966), pp. 82-94.

[16]Rogers, Diffusion of Innovations, op. cit., pp. 123-46.

[17]"The Systems Approach," Audiovisual Instruction, 11, No. 6 (June-July, 1966), 431-32.

III. The Instructional Process (Curriculum Innovation)

IV. The Communication Message (Related, Non-related)

V. The Innovation Adoption Decision (Commitment, Non-commitment)

The model assumed under the current study is the condition whereby the faculty member (discipline centered with a positive orientation to change) approaches the instructional development specialist (change agent) for the presentation of a message (related or non-related) about an instructional process (innovation) for the faculty member's adoption decision (commitment or non-commitment). The recognition of the need is internal to the system while the origin of the new idea is external.

Instructional Development Specialist as a Change Agent

The professional discipline of instructional development and technology as it exists on campuses of higher education is concerning itself and its practitioners with the implementation of new methods, approaches, techniques and ideas of a curricular nature. As such, it has been established as one of the many change agencies concerned with curriculum innovation. The practitioners, as suggested by Rogers,[18] can be considered change agents who deal with

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[18]Everett M. Rogers, "Needed Research on Diffusion Within Educational Organizations" (paper presented at the National Conference on the Diffusion of Educational Ideas, Michigan State University, East Lansing, Mich., March 26-28, 1968), pp. 16-21.

change agent-client relationships. Their behavioral goals are the securing of a commitment to experiment with the curriculum innovation. This process can be best illustrated by a short description of the activity at Michigan State University.

Service courses of large enrollments pose problems for college and university departments. The content is of a survey nature for which the professor is highly specialized in his approach. The Educational Development Project[19] was asked for assistance in the development of the basic course in the Department of Geography. The department tried to cope with the growing enrollments in the basic course by hiring more instructors to teach additional sections. But each instructor was a specialist in one area of the general discipline. With this kind of explicit specialization final exams were widely variant and in the words of the department chairman, "Geography 201 should have been treated as ten separate courses instead of one." So the basic decision was one of answering several questions. Do we add more sections or do we make the existing ones larger? How do we effectively utilize the talents of the graduate teaching assistants? What can be done with the slides, charts, graphs, motion pictures and other visual aids that have been prepared over the years? Is there

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[19]"Revising a Basic Course," Educational Development Program Report, No. 15 (East Lansing, Mich.: Michigan State University Educational Development Program, January, 1968), pp. 1-3.

something that can be done with the quality of the teaching/ learning process?

A complete re-thinking of the course seemed in order and Dr. Matley was assigned to spend half his time for one year on this project. First the basic decision was made to increase the size of the Geography 201 lecture sessions. Were there common concepts that could be taught? Dr. Matley then went to the Instructional Development Service for assistance. He was counselled in the value of establishing behavioral objectives, the technique of problem posting, methods of evaluation and the utilization and integration of the visual materials existent plus the necessity of creating additional ones for the expressed purposes called for by the insights gained under the instructional development process. The development of a series of concepts were then presented to the numerous faculty who had been assigned to teach the course for their evaluation and suggestions.

This composite example provides insight into a good deal more than the activities of the professional development person. It attempts to lay the groundwork for an understanding of the entire developmental process. It can be seen that the instructional development specialist is available to assist the faculty member who wishes to utilize the facilities and services available to him. These

services include a change agency skilled in determining behavioral objectives, instructional technology support and evaluation strategies.

Discipline Centered, Positively Oriented to Change Faculty Member

The study of instructional development quickly leads to the notion that formal courses of study can be evaluated in terms of their specified outcomes with feedback resulting in a further refinement or refinements increasing the probability of the previously stated outcomes or causing the outcomes to be re-defined.

In the earlier referred to Conference on Curriculum Innovation, Johnson[20] has suggested several clusters of the generalized problem. He cites the role of the university in conflict with the frustrations of the students in the rigidity of its educational grasp. There is, in addition, little time for the faculty to consider alternative teaching/learning strategies and the "publish or perish" syndrome forces them to devote less time to the teaching function. This is coupled with the unavailability of curricular machinery to deal with more than a superficial change. Finally he states that relevant strategies are not given the attention being demanded by all the other factors.

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[20]Johnson, "Action and Reaction: . . .," op. cit., p. 6.

Given a strategy for curricular development what does the research evidence indicate? MacKenzie[21] states teachers, students, subject matter, methods, materials/facilities and time as the determiners of curriculum. He later suggests a means of effecting curricular development by concentration on the teacher component. Mort[22] suggests that an unusually long period of time elapses between the perceived need for curricular change and its introduction into the system in the form of a specific plan. Evans[23] makes a similar statement by commenting on the exceeding slowness of change in educational methods due to general faculty resistance and often open hostility. This inertness is also comically portrayed by Peddiwell[24] who showed that the curriculum designed for primitive man became an established pattern even after the conditions it had been designed for were dramatically changed by the environment.

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[21]Gordon MacKenzie, "Curricular Change: Participants, Power, and Processes," in Innovation in Education, ed. by Matthew B. Miles (New York: Teachers College Press, Columbia University, 1964), pp. 420-23.

[22]Paul Mort, "Studies in Educational Innovation From the Institute of Administrative Research: An Overview," in Innovation in Education, ed. by Matthew B. Miles (New York: Teachers College Press, Columbia University, 1964), pp. 317-28.

[23]Richard I. Evans in collaboration with Peter Leppman, Resistance to Innovation in Higher Education (San Fransisco, Calif.: Jossey-Bass Inc., 1967), p. 3.

[24]J. Abner Peddiwell, The Saber-Tooth Curriculum(New York: McGraw-Hill, 1939), pp. 25-44.

The general lethargy of our past educational history toward change seems to be similar to the built-in compensation of our legal system. Since we can never know of a man's guilt or innocence, our culture seems to say . . . "It's more important that guilty men go free than to put one innocent man to death." Perhaps the analogy to educational innovation is comparable. "It's better to continue to educate as we do and risk missing out on some worthwhile innovations than to make widespread adoption of one that would be ruinous to our children."

Rogers[25] states, as a possible reason for the lethargy, the nature of a complex organization such as an educational institution and the way the information flows through the communication channels. Therefore, knowledge of the flow of information about an innovation by teachers, the prime movers, seems essential.

A positive orientation to the change process of the faculty member seems likewise essential for the Instructional Development Specialist to be able to work effectively with the development model. It seems clear that until a problem is perceived by the faculty member; until a need is felt for the innovation (in this case undifferentiated help), no adoption, much less consideration, will occur. This is a strategy for the Instructional Development Specialist. Further examples of this strategy are:

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[25]Rogers, "Needed Research . . .," op. cit., pp. 16-21.

> . . . I'm getting bloody tired of giving each lecture twice. I understand that you people . . . could make a film or something of me in the lecture hall and reach all of the students that way. Can you help me?[26]

> . . . he believed that Dr. Green was keenly interested in experimenting with instructional techniques . . . a preliminary conference . . . revealed that he was ready and willing to participate in the project.[27]

> Harboring a conviction that students can be taught higher cognitive processes through other methods of instruction, the team decided to analyse one unit in order to develop an instructional strategy appropriate to this particular body of content.[28]

> Dr. Sturr had previously visited the Center for Instructional Communications seeking the development of materials for his course. Because of his purpose and his eagerness when confronted with some new media, we approached him to determine his readiness. He was ready and willing to assist us in investigating this program.[29]

The previous approach situations reflect the necessity for the faculty member to be motivated, by a problem recognition, to seek out the services of the Instructional Development Specialist. Not until the individual actively enters the system with his perceived problem and willingness to be approached will any progress be made. Thus a major

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[26]Gary N. Hess, "Education of a Professor," Educational TV, 1, No. 4 (February, 1969), 20-22.

[27]Barson, Instructional Systems Development:. . ., op. cit., p. 28.

[28]Faris, Terminal Program Report: . . ., op. cit., p. 32.

[29]Barson, Instructional Systems Development: . . ., op. cit., p. 27.

emphasis will be to seek to determine which of two competing message strategies will increase the probability of acceptance of a given curriculum improvement by the teacher involved thus affording the higher proportion of acceptances.

Since the objective of the change agent is to secure a commitment to adopt from a positively oriented faculty member; the question remains as to how best to put the information for the highest probability of adoption. The research question deals therefore with the strategy for obtaining the commitment on the part of the faculty member to adopt the proposed innovation. In other words, should the message that the instructional development specialist present to the client be in the discipline area of the client or in a non-related area?

The Instructional Process (Curriculum Innovation)

A study of curriculum innovation must, of necessity, draw attention to the process of change itself. While the subject of change in curriculum content has been widely dealt with in professional literature, less concentrated efforts have been directed toward the all-important process involved in bringing about desired changes.[30] This process is of primary concern in this study.

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[30]Charles A. Blackman, "The Process of Change" (mimeographed handout, College of Education, Michigan State University, East Lansing, Mich., 1965), preface.

Compressed speech is a specially processed recording in which rate can be varied without affecting pitch. It can be used to transmit increased amounts of information to more students in less time. It can also present more verbal narrative per unit time of visual display.

Because of its recent development and the likelihood that the experimental population would be unfamiliar with the technique, it was considered appropriate for use as the innovation on which to test the hypothesis. Its inclusion is reviewed for reasons of determining maximum limits of intelligibility of the messages. Comprehension therefore is not being tested.

The study of compressed speech was first begun by Garvey[31] in 1953 when he hypothesized that abbreviated speech patterns retained their recognition. Fairbanks and Kodman,[32] working in the area of word intelligibility, demonstrated that compression rates up to 200 words per minute (wpm) were acceptable. Later it was found by Diehl, White and Burke[33] that between 126 to 172 wpm,

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[31]W. D. Garvey, "The Intelligibility of Abbreviated Speech Patterns," Quarterly Journal of Speech, 39 (1953), 296-306.

[32]Grant Fairbanks and Frank Kodman, Jr., "Word Intelligibility as a Function of Time Compression," Journal of Acoustical Society of America, 29 (1957), 636-41.

[33]Charles F. Diehl, Ronald C. White and Kenneth Burke, "Rate and Communication," Speech Monographs, 26 (1959), 229-32.

listening comprehension was unaffected by changes in word rate. Nelson,[34] increasing word rate from 125 to 175 wpm and Harwood,[35] increasing from 150 to 225 wpm found a slight loss in comprehension. Foulke, Amsler, Nolan and Bixler[36] found comprehension slightly affected by increasing word rate up to 275 words per minute. Voor and Miller[37] demonstrated that a slight improvement existed in comprehension during initial practice trials. However, Foulke[38] found no such improvement from training.

It seems evident therefore that comprehension of spoken materials is not significantly affected by increasing word rates up to about 250 to 275 words per minute. The evidence of where the precise point of decline is is lacking, therefore a word rate of under 200 wpm would seem to be safely within the established parameters. Since effects of practice are not clear it would again seem wise to avoid

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[34]Harold E. Nelson, "The Effect of Variation of Rate on Recall by Radio Listeners of 'Straight' Newscasts," Speech Monographs, 15 (1948), 173-80.

[35]Kenneth A. Harwood, "Listenability and Rate of Presentation," Speech Monographs, 22 (1955), 57-59.

[36]Emerson Foulke, Clarence H. Amster, Carson Y. Nolan and Ray H. Bixler, "The Comprehension of Rapid Speech by the Blind," Exceptional Children, 29 (1962), 134-41.

[37]John B. Voor and J. M. Miller, "The Effect of Practice Upon the Comprehension of Time Compressed Speech," Speech Monographs, 32 (1965), 452-54.

[38]Foulke, op. cit, pp. 198-206.

possible contaminating sources of bias and eliminate any practice trials.

The Communication Message (Related, Non-related)

The study is focusing on the faculty member approaching the instructional development specialist with an obvious instructional problem. He is anticipating a presentation of information concerning his problem. The instructional development specialist has several new ideas for his consideration. Since the faculty member is discipline oriented, the change agent is faced with several communication strategies.

The one of central interest to this study is: should the message about the process (innovation) be constructed around the discipline of the faculty member or should the message be constructed outside the discipline of the faculty member.

Barson[39] suggests that the discipline relatedness of the message negatively affects its value. The content gets in the way of an understanding of the process being communicated such that at the conclusion of the presentation the process under discussion is not understood. Rogers[40] suggests that relative advantage of the innovation is positively

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[39]Haney, Lange and Barson, op. cit., pp. 358-71.

[40]Rogers, Diffusion of Innovations, op. cit., pp. 124-47, 308-16.

related to its rate of adoption.[41] It is also noted that compatibility and fulfillment of perceived needs are also positively related to rate of adoption. Cohen's[42] research indicates that persuasive messages are accepted more readily when the source first creates a need then delivers a message which satisfies that need, rather than deliver a message then create the need. Klapper[43] notes that persuasive communication messages are thought to be more successful with persons who had no prior opinion or who had a "neutral" orientation.

Intuitively, the notion of direct application to content area seems plausible. In the Title VI-B Institute at Indiana University in 1967, the strategy of direct example was utilized in the Mathematics and Microbiology departments during the initial phase.[44]

Stowe,[45] in a recent Audio Visual Instruction article, suggests that, in development activities, when visualizing experiences, the media professional is best advised to deal with issues having real reference to the

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[41] Ibid., pp. 126-130.

[42] Cohen, op. cit., pp. 1-22.

[43] Joseph T. Klapper, The Effects of Mass Communication (New York: Free Press, 1960), p. 54.

[44] Faris, Terminal Program . . ., op. cit., pp. 32-37.

[45] Richard A. Stowe, "Putting Salt on the Tiger's Tail Or How To Work With Teachers," Audiovisual Instruction, 13, No. 4 (April, 1968), 335-37.

teacher's own classroom. Rhodes,[46] using Havelock's model of linkages, advises the instructional development specialist to appreciate the client's internal needs and problem-solving patterns in order to make relevant and effective solutions. Peet[47] offers essentially the same advice for development decision making by emphasizing accuracy and relevancy of initial experience. Anderson[48] likewise suggests that producer services to the instructional development process provide related examples produced external to the classroom. Carpenter and Greenhill[49] state that the introduction of media must have clear relations to the faculty member's needs as he perceives them. When these needs are met through the perceived solution of critical problems, the introduction of the media is advanced, though not assured. Miller,[50] citing Carlson, indicates that people will accept (adopt) innovation which they both

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[46]Lewis Rhodes, "Linkage Strategies for Change: Process May Be the Product," Phi Delta Kappan, LI, No. 4 (December, 1969), 204-207.

[47]Frank A. Anderson, "Hoban's Heroes Need Help," Audiovisual Instruction, 13, No. 3 (March, 1968), 254-57.

[48]Dennis W. Peet, "A Model for Media Development," Training in Business and Industry, 6, No. 1 (January, 1969), 25-28.

[49]C. R. Carpenter and L. P. Greenhill, "Providing the Conditions for Learning: The 'New' Media," in Higher Education, ed. by Samuel Baskin (New York: McGraw-Hill Co., 1965), p. 147.

[50]Peggy L. Miller, "Change Agent Strategies: A Study of the Michigan-Ohio Regional Educational Laboratory" (unpublished Ph. D. dissertation, Michigan State University, 1968), p. 31.

understand and perceive as relevant. Witt[51] comments that teacher preparation programs would do well to utilize the media by relating its use to the educational programs that attempt to train teachers to be good users of technology. Ginzberg[52] describes the process of relating subject matter to the real world experiences that the students will face and are interested in. Rogers[53] advises curriculum innovation planners to develop innovations that have clear cut relative advantages over the techniques being replaced.

Although the evidence appears to indicate the use of related messages the heuristic[54] remains a testable hypothesis.

Evidence of this is that Haney, Lange and Barson[55] found when presenting information about an instructional process to the members of the 1965 instructional systems institute; the discipline related message strategy was not getting the adoption commitment. They found that when presented with information about the concept of programed

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[51]Witt, op. cit., pp. 54-63.

[52]Eli Ginzberg, "Manpower Needs in a Technological Society and Their Implications for Education," in Technology and the Curriculum, ed. by Paul W. F. Witt (New York: Teachers College Press, 1968), p. 42.

[53]Rogers, "The Communication of Innovations: . . .," op. cit., p. 21.

[54]The heuristic is labeled No. 14 in the AVCR article referred to under footnote 39 (page 34) and is named: "Don't let subject matter interfere with an understanding of process."

[55]Haney, Lange and Barson, op. cit., pp. 358-71.

instruction in their subject matter area, the clients became concerned with the content of the process to the exclusion of the process itself. When subsequently questioned about elements of the techniques of programing as it related to their instructional problems, they had missed the salient features of programing itself.

It is therefore felt that the hypothesized strategy: that is, presenting information about an instructional process to a discipline oriented faculty member outside his area of expertise, if validated, provides an interesting and valuable alternative to the innovation process as practiced by the instructional development specialist.

The Innovation Adoption Decision (Commitment, Non-commitment)

The remaining question having bearing on this study is of the nature of the innovative/diffusion process. It will be necessary to discuss briefly the nature of the process as it relates to the study.

Rogers[56] has suggested that an innovation can be considered as an idea, object or practice perceived as new by members of a social system having been communicated to via certain channels in the hope of its being adopted over time.

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[56]Everett M. Rogers and J. David Stanfield, "Adoption and Diffusion of New Products: Emerging Generalizations and Hypotheses" (paper presented at the Conference on the Application of Sciences to Marketing Management, Purdue University, July 12-15, 1966), p. 3.

This is essentially what the instructional development specialist is about. The innovation/decision process is the amount of time required for an individual to pass from first knowledge of an innovation through an attitude formation stage to a decision point and finally on to evaluation or confirmation.[57] The process has, for this study, been collapsed from the four stages or functions to three; namely from knowledge to attitude formation to decision. This was done since the evaluation or confirmation stage was not available to the faculty members of the experimental population. The process has further been collapsed in time from an activity that is usually conceived to occur over some time to one which, of necessity, will occur in something under one hour, the time available for the experiment.

Several characteristics are thought to affect the adoption rate of innovations. Strong positive and negative relationships have been shown to exist between characteristics of an innovation and its subsequent rate of adoption. Summarizing the research literature Rogers[58] reports the following:

1. Innovations which have a perceived high relative advantage will be adopted more rapidly than those with little advantage.

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[57] Rogers, "The Communication of Innovations: . . .," op. cit., pp. 10-11.

[58] Ibid., pp. 4-5.

2. As the complexity of innovations increases, their rate of adoption decreases.
3. The more convenient an innovation lends itself to limited trial prior to full-scale adoption, the more rapidly will be its rate of adoption.
4. An innovation that is compatible with the existing nature of the individual will be adopted more rapidly.
5. The more observable an innovation is in its use by others the more rapid will be its rate of adoption.

In addition, Rogers[59] and others have postulated that a number of adopter categories can be thought to exist for the population of potential adopters. The categories are:

1. Innovator
2. Early Adopters
3. Early Majority
4. Late Majority
5. Laggard

These categories define an individual's willingness to adopt, from the earliest (innovator) to the most reluctant. This study deals with the first or innovator category.

As may be recalled from the opening chapter, for purposes of this study, the assumption is made that the

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[59]Rogers, Diffusion of Innovations, op. cit., pp. 148-92.

subjects for this experiment are a-priori positively oriented to change and can be considered as innovators. The rationale for this stems from the research concerning adopter categories as suggested by Rogers[60, 61] and Hildebrand and Partheimer.[62] They have established strong positive relationships between innovators and information seeking behavior, venturesomeness, and risk taking. The primary investigators have demonstrated that innovators travel directly to the source of the information they are seeking, rather than to rely on the local information sources such as neighbors. They are also known to participate to a greater degree in extension service activities. Travel is vital to the innovator who will go to some distance to observe new techniques at other locations.

Since the institute (Math-Science) was at some distance for the participants, travel was necessary. The members selected to join the institute at their own volition. Since the institute staff were considered as sources of information, these participants were conforming to the criteria of direct source information seeking. Their participation itself can be thought to be analagous to the greater degree of participation in extension service

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[60] Ibid., pp. 168-88.

[61] Rogers and Svenning, op. cit., pp. 169-94.

[62] Peter E. Hildebrand and Earl J. Partenheimer, "Socio-Economic Characteristics of Innovators," Journal of Farm Economics (May, 1958), 446-49.

activities on the assumption that this is a form of extension work. It seems therefore that the selection of the participants as innovators is justified.

It now seems apparent that the instructional development specialist has at his disposal the necessary prerequisites to the implementation of the proposed model strategy. The faculty member has actively entered the system with a perceived instructional problem. He is positively oriented to change and has a strong discipline orientation. The instructional development specialist has an instructional innovation for the faculty member's consideration and evaluation as a proposed solution to the problem. The remaining question concerns the strategy of presenting the message about the innovation in a related or non-related manner. This is the research question which is dealt with in the following chapter.

CHAPTER III

PROCEDURES AND METHODOLOGY

Statement of the Problem

The primary concern of this study is the determination of which of two competing message strategies is more probable to secure the adoption commitment of a faculty member to an instructional technology innovation. Stated differently, it is hypothesized that discipline centered, positively oriented to change faculty members will make more commitments to adopt when presented with a non-discipline related message than when presented with a discipline related message.

Hypothesis

The null form of the hypothesis is: there will be no difference between number of adoption commitments of faculty members who hear discipline related messages versus non-discipline related messages.

Population

To test this thesis experimentally, a population of appropriate subjects (N=44) was obtained from three on-going Science-Math summer institutes for high school teachers in the three discipline areas of Mathematics,

Earth Science and Biology. Approval for their participation and notification of experimental times was obtained from the various directors (see Appendix A).

Message Construction

Since the instructional innovation, compressed speech, was to be presented in verbal narrative form, a professional radio announcer was secured for the reading of the material in the messages. The researcher read the initial instructions to the experimental groups.

Three messages (see Appendices B, C, and D) were constructed from textual materials which were provided by the directors of the various institutes as being representative of both the level and concepts being then currently taught in the three related disciplines.[1,2,3]

Introductory chapters were used as a basis for the message construction. Approximately nine minutes of narration was obtained from each of the three texts. Decision rules for the editing process included the elimination of visual symbols, footnotes, paragraph headings and any graphic description.

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[1]G. Cuthbert Webber and John A. Brown, Basic Concepts of Mathematics (Reading, Mass.: Addison-Wesley Publishing Company, Inc., 1963), pp. 159-73.

[2]William L. Stokes and Sheldon Judson, Introduction to Earth Science (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1968), pp. 249-52.

[3]J. D. Watson, Modern Biology (New York: W. A. Benjamin, Inc., 1965), pp. 1-8.

A fourth message (see Appendix E), musical selections, was constructed and judged to be "neutral" in content as was each of the messages judged to be discipline related.

A fifth message (see Appendix F), musical selections (different from the above), was constructed to serve as an introductory musical environment which would serve to control entrance behaviors upon arrival at the lab. The five messages were then recorded on 1/4 inch audio tape prior to the experiment.

Language Laboratory

Arrangements were made through the late Dr. Sergei Andretz for use of the Michigan State University language lab facility located in Wells Hall B-100. Thirty-six booths were reserved for three time periods during two days, July 1, 1969 at 3:00 P.M. and July 2, 1969 at 10:00 A.M. and 3:00 P.M.

The language lab was selected because of its large, flexible and controlled environment. Each of the 216 student stations has headphones with individual volume control, visual and sound separation from the adjacent booth and can be programed, from the master control room facility, to receive any one of twelve separate audio sources.

Audio Component

The three discipline related messages were then compressed on an Eltro Information Rate Changer MLR 38/15.[4] The amount and percentage of compression as well as time was kept constant across the three experimental message treatments (M_1=76.3%, M_2=76.3%, M_3=75.4%). The non-compressed control message was also the same length as the compressed experimental messages. The introductory music tape was constructed to be sufficiently long to allow all subjects to be in their respective booths ready for the experiment. In this way all subjects would be exposed to equal treatment and experimental times (M_1=6:53, M_2=6:53, M_3=6:55, M_4=6:53).[5] All instructions for the experimental and control conditions were included on the tapes.

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[4] Mr. Anton Springer originally designed a device called the Tempo Regulator. The machine as re-designed and used is called the Eltro Information Rate Changer Mark II, MLR 38/15, and is available from Gothan Audio Corporation, 2 West 46th Street, New York, New York 10036.

[5] All tapes were timed and leadered to control for differences in presentation times. The tapes were within three seconds of each other. This variance is attributable to slight speed variations in the Eltro compressor and associated record and playback equipment at the time of compression. During the experiments tape recorder speed variations were again slight but were not judged significantly different from the recorded masters (see Table 1 for time comparisons during the actual experiment).

TABLE 1.--Differences in Playback Times for Messages During Experiment.

	T_1	T_2	T_3
M_1	6:50	6:52	6:50
M_2	6:50	6:53	6:52
M_3	6:54	6:52	6:52
M_4	6:52	6:50	6:54
M_5	11:58	11:55	12:01

M = Message Conditions

1 = Mathematics
2 = Earth Science
3 = Control
4 = Biology
5 = Music Introduction

T = Experimental Time

1 = July 1, 3:00
2 = July 2, 10:00
3 = July 2, 3:00

Instrumentation

A forty item Likert-type scale (see Appendix G) was constructed similar to that used by Trumbo.[6] Additional consultation with Davis[7] and Warrington[8] resulted in a limited pilot run (S=5) to determine final clarity of intent and time requirements. The items were constructed to elicit extent of agreement or disagreement along a five step continuum.[9] Analysis of variance was performed on the internal consistency of the commitment scales and is discussed further in Chapter IV.

Validity for the data is assumed and is based on previous work with this scaling technique. Page,[10] Miller,[11]

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[6]Donald A. Trumbo, "An Analysis of Attitudes Toward Change Among the Employees of an Insurance Company" (unpublished Ph. D. dissertation, Michigan State University, 1958), Abstract, pp. 25-32.

[7]Initial conference with Dr. Robert Davis of MSU's Learning Service.

[8]Dr. Willard Warrington, director of Evaluation Services, provided additional information on item construction.

[9]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), pp. 492-95.

[10]James L. Page, "NDEA Institute for Advanced Study in Educational Media," Final Report, Instructional Media Center, Michigan State University, July 31, 1967 to Sept. 1, 1967, pp. 15-25, Appendices II, III, IV, V.

[11]Miller, "Improvement in Media . . .," op. cit., pp. 29-80, Appendix D.

McIntyre,[12] and Trumbo[13] have demonstrated validity with the construction of similar scales and data.

According to previous research studies by Rogers[14] and Kivlin,[15] forty items were constructed and integrated to obtain as many measures of commitment to adopt by the subjects. Eight item units were constructed in each of the five characteristic groups which have been shown to exhibit strong positive relationship between innovation and rate of adoption. These characteristics are:

1. Relative Advantage
2. Compatibility
3. Observability
4. Complexity
5. Trialability

Thus an individual's total score is seen to be made up of components from each of the five characteristics. This score, when computed, is defined as the individual's commitment to adopt.

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[12]Kenneth M. McIntyre, "A Study to Determine Specific Sources of Resistance to the Use of Audio-visual Materials by College and University Teachers and the Development of Procedures for Overcoming the Barriers to Optimum Use," Final Report, Title VII (A) NDEA, University of North Carolina, Chapel Hill, N. Car., 1963, pp. 28-50.

[13]Trumbo, op. cit., Abstract.

[14]Everett M. Rogers with F. Floyd Shoemaker, Diffusion of Innovations: A Cross-cultural Approach (Glencoe, N. Y.: Free Press of Glencoe, N. Y., 1970 in press), pp. 29-30.

[15]Joseph E. Kivlin, "Characteristics of Farm Practices Associated With Rate of Adoption" (unpublished Ph. D. dissertation, Pennsylvania State University, University Park, Pa., 1960), pp. 12-46.

Randomization Procedures

Approximately half (N=18) of the forty items were constructed as negatively oriented while the remaining (N=22) were positive. The items were then randomly ordered for presentation in a linear sequence format.

The experimental environment (language lab booth locations) was randomly assigned within array levels to the four treatment conditions (see Figure 3).

The subjects were randomly assigned to booth locations within array levels thus assuring random assignment to treatment conditions.

Equipment Used

Equipment used for the experiment included an Eltro Information Rate Changer II, two Ampex tape recorders (300-C, 351), a Magnecord 1020, and Crown 85 tape recorders and eighteen Brush Clevite headphones. All taped information was recorded at 7 1/2 inches per second, 1/2 track monophonic with the exception of the pre-compressed masters. The verbal presentation of the messages was recorded with an ElectroVoice RE-15 microphone through a limited compression/equalized automatic gain reduction amplifier feeding a Magnecord 1020 tape recorder at 15 ips. full-track. This speed and track configuration being required for Eltro compression. The tape medium used throughout was Scotch (3M) 201-1200'.

B 31	B 32	B 33	B 34	B 35	B 36
4	2	1	2	3	4
B 25	B 26	B 27	B 28	B 29	B 30
2	4	1	3	3	1
B 19	B 20	B 21	B 22	B 23	B 24
1	4	2	3	4	1
B 13	B 14	B 15	B 16	B 17	B 18
1	4	2	3	3	2
B 07	B 08	B 09	B 10	B 11	B 12
2	3	1	2	4	3
B 01	B 02	B 03	B 04	B 05	B 06
4	2	3	1	1	4

Key: 2 = Mathematics

1 = Earth Science

4 = Biology

3 = Control

All booths (B 01 to B 36) = Introductory Music

Fig. 3.--Language Laboratory Experimental Setup.

Experimental Procedures

The experiment was conducted over a two day period. In order to disturb each of the three on-going institute sessions as little as possible, three time periods of one hour each were provided. Essential to the validity of the results was the stipulation that all experimental time periods be conducted as exactly the same as possible. The researcher spent many hours in consultation with the language lab technician who was to act as lab assistant until satisfied that the procedure was not only practicable but also that the conditions necessary for the experiment were controlled.

The subjects were instructed to report to the lab at the following times:

Mathematics	July 1, 1969	3:00 - 4:00 P.M.
Earth Science	July 2, 1969	10:00 -11:00 A.M.
Biology	July 2, 1969	3:00 - 4:00 P.M.

At the prescribed times, the subjects entered the lab and were randomly assigned to booths isolated for the experiment. Just prior to their arrival, the music introductory tape was fed to all assigned booth locations. In each booth were pencil and inventory/instrument containing the initial instructions on how to proceed (see Appendix H).

At the conclusion of the music introduction tape (11:58), all subjects had been able to complete Part I of the instrument (see Appendix I). At this time, all

occupied booths were switched to the randomly assigned message treatment conditions. The tape provided all further verbal instructions.

During the running of the experiment, at each of the three time periods, the researcher randomly checked to be certain that the booth location indicated was, in fact, getting the message treatment which had been assigned to it. Section and seat locations were called for on each copy of the instrument but the procedure just mentioned was undertaken as a necessary precaution. It was ascertained that booths indicated were receiving the intended message treatment.

At the conclusion of the experimental message treatments, the subjects were directed to fill out the questionnaire instruments. On the last page they were instructed to hand in the instrument and that they were free to leave. Questions about the "true" nature of the experiment were dealt with only after all forms were turned in. The total times of the experiments were:

Mathematics	3:00 - 3:38	38 minutes
Earth Science	10:00 -10:30	30 minutes
Biology	3:00 - 3:45	45 minutes

The overall design of the experiment is represented by Figure 4.

The experimenter was convinced that the experimental environment of the language laboratory offers real

Subjects	Messages			
	Earth Science	Biology	Mathematics	Control
Earth Science	4, 5, 9	1, 6, 11	2, 7, 10	3, 8, 12
Biology	30, 31, 35, 39	27, 32, 37, 40	28, 33, 36 41, 46	29, 34, 38, 42, 43
Mathematics	16, 17, 21, 25	13, 18, 23, 26	14, 19, 22	15, 20, 24

Fig. 4.--Subject Number in Each Experimental Condition.

advantages to further research in this area. The control of extraneous variables such as visual distractions, subject interaction and noise exceeds that commonly available to the experimental situations found in most classroom environments. Flexibility of the particular lab was also excellent and allowed the current research to function as naturally as possible.

One criticism, however, is in the unnaturalness of the situation. The instructional development model process usually takes place in much more informal surroundings. However, given that the objective of an experiment is to provide as controlled an environment as possible to establish the relationship between two or more variables, it was felt that the experimental criteria should take precedence.

CHAPTER IV

ANALYSIS OF DATA

Review of Experimental Procedure

The purpose of the current study was to determine, given a positively change oriented faculty in a specific discipline, which of two competing message strategies, i.e., related or non-related, would secure the higher mean number of adoption commitment decisions.

A population of appropriate subjects were selected from three Science-Math Institute groups and randomly assigned to one of three experimental treatment groups. Each of the subjects were from one of three discipline areas which were: Biology, Earth Science, and Mathematics.

A message, about a recent innovation in education called compressed speech, in each of the three subject matter fields was prepared and compressed.

The three experimental conditions were related, non-related and control. Related was defined as an Earth Science message heard by an earth scientist; Biology message to a biologist and Mathematics message to a mathematician. Non-related was defined as an earth scientist, biologist or mathematician receiving a message other than one from his field. The control condition was a series of

musical selections having no relation with or to compressed speech.

At the conclusion of the message treatments, all subjects took an instrument which attempted to assess their commitment to adopt the use of compressed speech in their teaching by asking them to respond to forty items composed of eight items for each of five characteristics of innovations previously shown to be strongly related to rate of adoption.

Hypothesis

The major hypothesis to be tested was that discipline centered, positively oriented to change faculty members will make more commitments to adopt when presented with an instructional technology innovation in a non-related subject matter area than when the presentation is made to them in their own subject matter area.

Analysis Procedure

Several analyses were thought to be necessary to the thorough understanding and interpretation of the data.

One way analysis of variance (ANOVA) was used to test for major effects between the three experimental conditions. The F statistic was used to test for significance.

Simple correlational analysis was performed for the five, eight item units of the instrument. Each question

was correlated with the mean of its category descriptor. Analysis of variance was computed on the five characteristics means across the three experimental treatment conditions and finally analysis of variance was computed on the characteristic means across the three discipline groups.

Major Effects

Design for the One-way ANOVA is seen in Figure 5.

	Related	Non-related	Control
Discipline	4, 5, 9, 14, 19, 22, 27, 32, 37, 40	1, 2, 6, 7, 10, 11, 13, 16, 17, 18, 21, 23, 25, 26, 28, 30, 31, 33, 35, 36, 39, 41, 44	3, 8, 12, 15, 20, 24, 29, 34, 38, 42, 43
	10	23	11

Fig. 5.--Subject Number in Experimental Conditions.

Computer analysis was performed on the data. At the .05 level of confidence, with 2 and 41 degrees of freedom, an F value of 3.23 would permit the rejection of the statistical hypothesis of no difference (see Table 2).

Table 2.--Analysis of Variance Table for Major Effects.

Source of Variance	Sum of Squares	Degs. of Freedom	Mean Square	F Value
Between Categories	71.619	2	35.809	.517 NS
Within Categories	2837.562	41	69.208	
Total	2909.181	43		

Clearly there is no statistical difference between the groups. Therefore the null hypothesis of no difference cannot be rejected.

Instrument Analysis - Correlation

It is necessary to obtain data on the instrument itself. Correlational analysis was performed on each of the five eight-item units which composed the instrument. These five characteristics had been previously shown to be strongly related to the rate of adoption of an innovation. These five units or characteristics are:

Characteristic	Question Number
1. Relative Advantage	2, 6, 10, 11, 19, 22, 25, 27
2. Complexity	1, 8, 9, 14, 24, 29, 30, 35
3. Compatibility	7, 17, 23, 26, 32, 34, 36, 37
4. Observability	4, 5, 12, 16, 18, 21, 33, 39
5. Trialability	3, 13, 15, 20, 28, 31, 38, 40

Thus for each of the eight questions in each of the five characteristic groups, a correlation coefficient will indicate the degree to which that question is related to the overall mean of the characteristic group. This value corresponds to a consistency value for each question. The results for this analysis are presented in Table 3.

The questions within each of the five characteristic groups can be seen to correlate reasonably well, with some

TABLE 3.--Question Correlation Within Characteristic Groups.

Characteristic Group	Question Number	Correlation Value
Relative Advantage	2	.18
	6	.57
	10	.70
	11	.36
	19	.45
	22	.49
	25	.57
	27	.46
Complexity	1	.60
	8	.56
	9	.34
	14	.69
	24	.41
	29	.41
	30	.29
	35	.40
Compatibility	7	.41
	17	.39
	23	.57
	26	.41
	32	.50
	34	.50
	36	.63
	37	.46
Observability	4	.53
	5	.60
	12	.40
	16	.49
	18	.14
	21	.71
	33	.41
	39	.24
Trialability	3	.53
	13	.35
	15	.39
	20	.44
	28	.43
	31	.64
	38	.39
	40	.34

notable exceptions,[1] with the mean value of the characteristic groups indicating that the questions seem to measure the characteristic consistently. This is not to imply complete endorsement of the instrument. With further refinement it would appear that the reliability could be increased with a corresponding increase in the strength of the confidence of interpretation. This will be explained further in Chapter V.

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[1]Derivation of expected correlation value determined by Mr. Bill Allard (Statistics consultant of Computer Center Applications and Programming).

Assume all eight questions are uncorrelated, i.e.,

$$p(X_1, X_j) = 0 \text{ if } i \neq j.$$

Then $COV(X_{ij}EX_i) = COV(X_{ij}X_i) = s^2_i = VAR(X_i)$

and $$p(X_{ij}EX_i) = \frac{\sigma_1^2}{\sqrt{\sigma_1^2 \, \sigma_{EXi}{}^2}} = \frac{\sigma_1^2}{\sqrt{\sigma_1^2 \, E\sigma_1^2}} .$$

Now assume $s_1{}^2 = s_2{}^2 = \ldots s_8{}^2 = s^2$,

then $$p(X_{ij}EX_i) = \frac{\sigma^2}{\sqrt{\sigma^2 \, (8\sigma^2)}} = \frac{1}{\sqrt{8}} .$$

If there are n <u>independent</u> questions, then we can expect a correlation coefficient of $\frac{1}{\sqrt{N}}$, specifically if all eight questions within a group are uncorrelated, then we can expect a correlation coefficient value of about .37. A lower value would indicate some negative correlation between a question and the mean of the characteristic group, while a higher value would indicate some positive correlation.

Instrument Analysis Across Experimental Groups

Analysis of variance was computed on the means of the five characteristic groups across the three experimental treatment conditions to determine if the characteristics were operating differentially across the experimental conditions. At the .05 level of confidence with 2 and 41 degrees of freedom, an F value of 3.23 would permit the rejection of an hypothesis of no difference. The analysis of variance table (Table 4) is presented below.

TABLE 4.--Characteristic Analysis Across Experimental Groups.

Source of Variation	Sum of Squares	Degs. of Freedom	Mean Square	F Value
Between Categories	35.068	2	17.534	.230 NS
Within Categories	3117.113	41	76.027	
Total	3152.181	43		

The hypothesis of no difference between the five characteristic groups and the three experimental treatment conditions may not be rejected.

Instrument Analysis Across Discipline Groups

Finally, multiple analyses of variance were computed on the five characteristic groups across the three discipline groups to determine any differences attributable to discipline. The results appear in Table 5. At the .05

TABLE 5.--Characteristic Analysis Across Discipline Groups.

Source of Variation	Sum of Squares	Degs. of Freedom	Mean Square	F Value
Relative Advantage				
Between Categories	10.910	2	5.455	.73 NS
Within Categories	305.520	41	7.451	
Total	316.431	43		
Complexity				
Between Categories	11.655	2	5.827	.53 NS
Within Categories	442.526	41	10.793	
Total	454.181	43		
Compatibility				
Between Categories	18.318	2	9.159	.99 NS
Within Categories	379.317	41	9.251	
Total	397.636	43		
Observability				
Between Categories	17.137	2	8.568	.88 NS
Within Categories	396.407	41	9.668	
Total	413.545	43		
Trialability				
Between Categories	7.551	2	3.775	.45 NS
Within Categories	341.426	41	8.327	
Total	348.997	43		

level of confidence with 2 and 41 degrees of freedom, an F value of 3.23 would allow the rejection of the hypothesis of no difference.

It is clear that no statistical difference exists between the three discipline groups on the basis of the five characteristic groups.

Summary

It is now apparent that no statistical differences are seen to exist between the groups as set forth under the conditions of the experimental treatments.

Demographic data, obtained during the experiment is summarized in Appendix J.

In the final chapter, further attempts will be made to discover some of the reasons underlying the results obtained during the experiment.

CHAPTER V

SUMMARY, DISCUSSION AND CONCLUSIONS

Summary

The results of an experimental procedure to determine which strategy is most effective in obtaining adoption commitment decisions can be valuable to the Instructional Development Specialist. His task is to provide a linkage system between the client and the agency of change.

Thus an experiment was undertaken whereby a population, composed of discipline centered faculty members who were predisposed to change, was presented with one of three previously constructed message treatments. One message was related to the discipline of the faculty member, a second message was not related to the discipline, and a third message was a control condition composed of neutral musical selections. The specific innovation was the technique of compressed speech. This technique employs a recorded tape which, when reproduced through the appropriate mechanism, alters positively or negatively the tempo of playback but does not affect the pitch component. After the subject heard one of the three conditions, he was asked to complete a short instrument; the purpose of which was to determine the individual's commitment to adopt

compressed speech in a teaching situation. The hypothesis of interest was: non-related messages will produce a significantly higher number of adoption commitment decisions by faculty members than will related messages.

Review of Analysis

Subsequent analysis of variance across the experimental groups and analysis of the instrument across both the experimental and discipline groups indicate no statistical differences exist between the groups as tested.

Correlational analysis was obtained for the instrument which was composed of five, eight-item, units shown by previous research to have been strongly related to an innovation's rate of adoption.

Discussion

An experimenter's major dilemma is to determine the underlying reasons when theory and experimentation do not support each other. The final section of this dissertation will explore possible reasons that might have caused this unexpected finding.

A somewhat remote but realistic possibility is that the results constitute a rare event. It is similar to that event when a true coin is flipped twenty-five times and heads is observed all twenty-five times. However, statistical procedures are such that the probability of the observance of a rare event are quite low.

Sample size is also a determinant of statistical precision. It is possible that a difference did in fact exist but that the population size (N=44) was too small to detect a minor difference which a larger sample size might have been able to do. A larger sample would also have added confidence to the evidence. Future studies would do well to obtain as large a population as possible consistent with statistical guidelines.

Variability due to lack of control of the experimental environment is a concern, but because of the language lab facility and the degree of control it makes available; this factor does not seem to have influenced the results to any measurable extent.

There are, perhaps, four major variables that contributed to the no difference results. Population selection, message treatment, reliability and the underlying assumptions of the instrument and the nature of the instructional development process are the conditions seen to be possible major sources of random variability and will be discussed in more detail.

Population Selection

Two reasons contributed to the decision to use the sample of high school teachers in the Science-Math Institute. One was the extremely fortunate tricotomy of discipline areas which they represented. Since the experiment called for a distinct related, non-related treatment

condition to be presented; their participation seemed essential. Secondly, since the experiment again called for faculty members, this group appeared to be most appropriate, especially since this group represented the population to which the research result was to be generalized.

One of the limiting factors stems from the fact that all three of the various discipline groups were related to the general area of the Science-Math Institute. It now seems possible that the members of the three discipline areas (Earth Science, Biology, Mathematics) are not as distinctly different as was originally thought. Analysis of the demographic data suggest that the content areas of Earth Science, Biology and Mathematics share more commonalities in educational preparation and practice than they exhibit differences. It might be advisable another time to select sample members from more discretely different disciplines.

It is difficult to assess the criterion of positive a priori orientation toward change which was presumed to exist in the population. While it is true that the members did satisfy the previously stated relationships of innovative behavior being higher in persons who travel to the source of the information, travel some distance to keep up-to-date, attend more professional meetings and exhibit information seeking behavior; demographic data suggests somewhat limited use of media facilities

(including active use of support personnel) and the resultant lack of awareness of the available technology. It is suggested that in future research where a priori positive orientation is thought to exist, strong evidence should be present, both in terms of attitudinal and use measures, that the conditions exist in the population from which the sample is drawn.

Message Treatment

The message conditions similarly reflect a question on the interpretation of the data as did the suggested sameness of the groups. Given that the messages reflected this same similarity rather than difference, it appears that the interaction of the two conditions, i.e., discipline and message similarity across all groups instead of the related condition, contributed in a major way to the non-difference results. Follow up studies are urged to see to it that the discipline areas be initially more disparate from each other than was the case with the present study.

An additional concern stems from how the compressed messages were interpreted. Although the messages were selected by content specialists from the institute, an alternative interpretation might suggest that the subjects responded to the content of the messages as adults rather than as high school teachers considering the use of a

technological innovation as a viable alternative to present classroom teaching practices.

Reliability and Assumptions of Instrument

Instrumentation in any experiment is of critical concern to the researcher who has designed a testing instrument out of the necessity of not having one available. Careful though its design may be, final validity rests with a demonstrated experimental trial. Of special interest to this study is the reliability of the instrument designed to obtain an indication of commitment to adopt. Reliability is a relative matter depending on the level one has chosen to accept as reliable.

From a statistical point of view, given the conditions of the experiment and the instrument, an expected value of .37 corresponds to a zero order correlation. Values less than .37 suggest some negative correlation while values greater indicate some positive correlation. While the overall reliability of the instrument is reasonably positive, there are questions which could be refined, restated, and in general revised to increase the reliability of the instrument.

A second assumption of the instrument itself is in the composition of the scales themselves. The instrument consisted of eight items in each of five groupings which have been shown through previous research to be strongly related to the rate of adoption of innovations. The use

of these characteristics as indicants of adoption commitment decisions may be called into question as not reflecting commitment but only rate. However, it seems appropriate to make the inference from past research efforts that since rate of adoption can be assumed to be a measure of time, and since the experimental process has collapsed the time dimension, then the greater rate of adoption should co-exist with the time compression of the experiment to constitute a measure of commitment to adopt. This assumption, however, should be subjected to further investigation and testing.

Nature of the Instructional Development Process

The process of instructional development can be conceived as one which takes place in a much less formal atmosphere than the controlled conditions of the experiment as conducted. A criticism of the experimental environment is that instructional development is thought to take place in the informal setting, such as the change agent's office in a one-to-one, face-to-face situation. It has been suggested that faculty members, even though positively oriented to the change process, prefer the informality of the neutral ground of a social setting where both the client and change agent can be free from interruptions in order to discuss instructional problems and their proposed solutions on a colleague-to-colleague basis.

The experiment was conducted in a relatively neutral or perhaps sterile environment, typical of one-way communication systems. The response patterns then might not truly reflect an instructional development process whereby the faculty member might ask questions, receive answers and re-ask questions, all of which had been designed by him to solve the basic instructional problem.

Further studies to obtain research results in this area might try to discover an experimental technique which would gather the individual data in addition to some realistic interview or simulated process data. It might be preferable to include situations which model the two-way communication activites that characterize instructional development.

A final concern lies in the experimental procedure being designed around the basic context of the innovation/diffusion process. Previous research efforts have defined diffusion as a social interaction process. Such variables as group pressure, perception of institutional feeling toward innovation, personality attributes, and the interrelationship of opinion leader-follower involvement in the multi-step communication pattern can be thought to effect the current research study. While it is realized that these variables are relevant to the understanding of the innovation/diffusion process, it is also believed that in order for experimental data to be obtained for validation,

the variables operating in the informal setting of the instructional development process must be restricted so that the process may be looked at in some greater detail than possible under the fluid and unrestricted communication pattern demonstrated in a normal instructional development operation. The nature of the instructional development process is then seen as one other possible reason for the lack of consistency between theory and experimental results as obtained. A position as to which data collection technique will be used must be decided, as part of the basic rationale, prior to the actual experiment.

Recommendations

On the basis of analysis of the findings contained in the current study, several suggestions might be made to direct future research efforts in more positive directions. The following recommendations are made with this in mind.

A. Select sample groups of faculty which represent distinctly different discipline areas. Avoid, where possible, groups which share similar educational backgrounds.

B. Create an environment for the experiment which parallels the informality of the instructional development process as carried out on a day-to-day basis. Include evaluative data which enables the subject to rate the "normalcy" of the experimental situation.

C. Refine measurement techniques which rate with accuracy the various dimensions of social interaction,

source credibility and relevancy of message to obtain more complete data on the instructional development process.

D. Obtain demographic data on previous innovation behavior such that the assumption of innovator classification may be validated.

Conclusions

No support was found through analysis of the data for the alternative hypothesis that non-related messages will obtain more commitment to adopt decisions by discipline centered, positively oriented to change faculty members than related messages. Possible contributions to the variance were seen to be a lack of real differences between the three disciplines and the non-relatedness of the messages which were designed as such. Secondly the instrumentation, as with all non-validated measures, should be subjected to further refinement in order to increase some of the weaker reliability values. Finally, question was raised as to the true reflection of the experiment to the instructional development process. It was thought that the lack of a social interaction referent, typical of the usual instructional development model, might be a factor that should have been taken into account. Social pressure, personal credibility and other interpersonal relationships were not studied and were therefore absent from the experimental measurement procedures.

It remains the personal belief of this researcher that the original heuristic, while unsupported in this study, still merits additional experimentation. The notion is intellectually sound that instructional development specialists, as change agents, should not allow subject matter to interfere with an understanding of process on the part of the faculty member. Future researchers are urged to pursue study in this area, taking into account the suggestions of this past research effort, as a meaningful addition to the understanding of this complex process. It is suggested that a wider divergence of disciplines in the faculty population be obtained so that the subsequent messages will more accurately test the heuristic which remains an unsupported but potentially valuable strategy.

Successful strategies of innovation/adoption decisions for the instructional development specialist can assist him greatly in the pursuit of his function of providing the linkage between the generation of new ideas and their ultimate use by the faculty client system.

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APPENDICES

APPENDIX A

EXPERIMENTAL GROUP NOTIFICATION

MICHIGAN STATE UNIVERSITY EAST LANSING · MICHIGAN 48823

INSTRUCTIONAL MEDIA CENTER

June 12, 1969

Dr. John Wagner
311-A Wells Hall
Campus

Dear Dr. Wagner:

This is to reconfirm our discussion on June 9, 1969 at which time I asked for your cooperation in the sampling of members of your six week institute in Mathematics and to express my appreciation for your support of my research project. Dr. Brandou suggested that I work directly with you in coordinating the data gathering stage of my dissertation.

Briefly then, I am proposing a two-step procedure. The first is a personal data instrument which gathers demographic data. This phase can be completed quickly and independently, taking about ten minutes at no inconvenience to the institute program or schedule.

The second stage will be the subject's responses to questionnaire items after having been exposed to a verbal message treatment. I am securing the facilities of the language lab to control extraneous presentation and environmental variables. For this activity it would be convenient if the participants could come to the lab at a prescribed time which will be established later. The maximum interruption would be one hour.

I would like to suggest June 30, July 1 or 2 as the three days to gather data. I will firm up these with you by personal visit.

Again, I am grateful to you for your efforts to assist me. I also understand that participation by the members of the institute will be strictly voluntary.

Very truly yours,

Curtis J. McCarty
Ph. D. Candidate
112 Linton Hall

CJM:mls

APPENDIX B

BIOLOGY MESSAGE

BIOLOGY MESSAGE

We are now ready for Part 2. If you have not finished with Part 1 you may complete the form at the conclusion of Part 2. Please wait to fill out the questionnaire until after you've heard the short message about a recent innovation in education called 'compressed speech.' At the end of the recording take a few minutes to fill out the responses asked for. When you have filled out both parts including the booth number on the first page please leave the form in the booth. Thank you very much for your cooperation.

It is easy to consider man unique among living organisms. He alone has developed complicated languages that allow meaningful and complex interplay of ideas and emotions. Great civilizations have developed and changed our world's environment in ways inconceivable for any other form of life. Thus, there has always been a tendency to think that something special differentiates man from everything else. This belief has found expression in man's religions by which he tries to find an origin for his existence and in so doing to provide workable rules for conducting his life. It seemed natural to think that just

as every human life begins and ends at a fixed time, man has not always existed but was created at a fixed moment, perhaps the same moment for man and for all other forms of life.

This belief was first seriously questioned just over 100 years ago when Darwin and Wallace proposed their theories of evolution, based upon selection of the most fit. They stated that the various forms of life are not constant but are continually giving rise to slightly different animals and plants, some of which are adapted to survive and to multiply more effectively. At the time of this theory they did not know the origin of this continuous variation but they did directly realize that these new characteristics must persist, if such variations were to form the basis of evolution.

At first there was a great deal of furor against Darwin, most of it coming from people who did not like to believe that man, and the rather obscene looking ape, could have a common ancestor, even if this ancestor had occurred some 50 to 100 million years in the past. There was also initial opposition from many biologists who failed to find Darwin's evidence convincing. Among these was the famous Swiss born naturalist, Agaziz, then at Harvard who spent many years writing against Darwin and Darwin's champion, T. H. Huxley, the most successful of the popular writers of evolution. By the end of the

19th century the scientific argument was almost finished; both the current geographic distribution of plants and animals and their selective occurrences in the fossil records of the geologic past were explicable only by postulating a continuously evolving group of organisms had descended from a common ancestor. Today the theory of evolution is an accepted fact for everyone but a fundamentalist minority whose objections are based not on reasoning but on doctrinal adherence to religious principles.

An immediate consequence of the acceptance of Darwinian theory was the realization that life first existed on our earth some one to two billion years ago in a simple form possibly resembling the bacteria, the simplest variety of life now existing. Of course, the very existence of such small bacteria tells us that the essence of the living state is found in very small organisms. Nonetheless, evolutionary theory further affects our thinking by suggesting that the basic principle of the living state is the same in all living forms.

This same conclusion is independently given by the second great principle of 19th century biology, the cell theory. This theory first put forward convincingly in 1838 by the German microbiologists, Schleiden and Schwann, proposed that all the larger plants and animals are constructed from small fundamental units called cells. All

cells are surrounded by a membrane usually containing an inner body, the nucleus which is also surrounded by a membrane called a nucleur membrane. Most important, cells arise only from other cells by the process of cell division. Most cells are capable of growing and of splitting roughly equally to give two daughter cells. At the same time, the nucleus divides so that each daughter cell can receive a nucleus.

Each nucleus encloses a fixed number of linear bodies called chromosomes. Before cell division, each chromosome divides to form two chromosomes identical to the parental body. This process, first accurately observed by Flemming in 1879, doubles the number of nucleur chromosomes. During nucleur division one of each pair of daughter chromosomes moves into each daughter nucleus. As a result of these events now collectively termed mitosis, the chromosomal complement of daughter cells is usually identical to that of the parental cell.

During most of a cell's life its chromosomes exist as highly extended linear objects. By the cell division however, the're condensed into much more compact bodies. The duplication of chromosomes occurs chiefly when they are in the extended state characteristic of innerphase. That part of the chromosome however, always duplicates during the contracted metaphase state. This is the centromere, the body that controls the movement of the chromosome

during cell division. The centromere always has a fixed location on a given chromosome, its specific location, however, varies with the specific chromosome. In some it is near one end, in others it occupies an intermediate region.

When a chromosome is completely duplicated except for the centromere, it is said to consist of two chromatids. A chromatid is transformed into a chromosome as soon as its centromere has divided, and is no longer shared with another chromatid. As soon as one centromere becomes two, the two brother chromosomes begin to move away from each other.

The regular lining up of chromosomes during the metaphase stage is accompanied by the appearance of the spindle. This is a cellular region, shaped like a spindle, through which the chromosomes of higher organisms move apart during the anaphase stage. Much of the spindle region is filled with long thin molecules which some people think are similar to the contractile protein of muscles. If this resemblance is genuine, then perhaps the same mechanism that underlies the contraction of muscles also underlies the movement of chromosomes through the spindle.

Objects called the nucleoli are also present in the nucleus of practically every plant and animal cell. There is at least one nucleolus per haploid set of chromosomes. In some cells the nucleolus is connected to a specific

chromosome. Until recently the functional role of the nucleolus was completely obscure, though some biologists originally thought that it might be related to the formation of the spindle.

One important exception was found to be the mitotic process. After the conclusion of the two cell divisions that formed the sex cells, the sperm and the egg, the number of chromosomes is reduced to one-half of its previous number. In the higher plants and animals each specific type of chromosome is normally present in two copies, the homologous chromosomes. In sex cell formation the resultant sperm and egg each usually enclose only one of each type. Union of sperm and egg during fertilization results in a fertilized egg containing one homolygous chromosome from the male parent and another from the female parent. Thus the normal diploid chromosome constitution is restored.

Although most cells are diploid in higher plants and animals, the haploid state is the most frequent condition in lower plants and bacteria, the diploid number existing only briefly following sex cell fusion. Usually miosis occurs almost immediately after fertilization to produce haploid cells.

This concludes the message. Please fill out the response instrument now.

APPENDIX C

EARTH SCIENCE MESSAGE

EARTH SCIENCE MESSAGE

We're now ready for Part 2. If you have not finished with Part 1 you may complete the form at the conclusion of Part 2. Please wait to fill out the questionnaire until after you've heard the short message about a recent innovation in education called 'compressed speech.' At the end of the recording take a few minutes to fill out the responses asked for. When you have filled out both parts including the booth number on the first page, please leave the form in the booth. Thank you very much for your cooperation.

How old is the earth? Granting that the earth has been making a yearly circuit of the sun for many, many years we are led to ask how many such journeys it may have made? Or, in other words, how old is it? Until fairly recent times the origin and age of the earth were not considered to be subjects for serious inquiry. Interpretations of Hebrew scripture, basis of the Christian faith of the Western world, were considered to be the final and sufficient word on this subject. In 1654, Archbishop James Usher conluded from scriptural analysis that the earth had been created in 4004 B.C. This was printed as a marginal date in several editions of the Bible and was quite

generally believed by most Christians. A few years later a learned Biblical scholar, Dr. James Lightfoot of Cambridge felt that he could be even more specific and wrote that heaven and earth, center and circumference, were made in the same instance of time, and clouds full of water and man was created by the Trinity on the 26th of October, 4004 B. C. at 9:00 in the morning. The idea of a 6000 year old earth was entirely satisfactory as long as there were no reasons for believing otherwise. It is interesting to note however, that ancient Hindu thinkers had placed the age of the earth at almost two billion years.

As the spirit of scientific inquiry began to assert itself, the age of the earth became a subject for serious consideration. Facts were few and meaningful observations were just beginning to be undertaken. Yet to some thinkers every natural feature of the landscape gave evidence of great antiquity. The cutting of valleys, the advance and retreat of glaciers, the destruction of coasts by erosion and the restoration by deposition all seem to demand long time periods. The quantitative data were needed and in the 18th and 19th centuries a few preliminary attempts were made to actually measure and evaluate certain properties of the earth in order to establish its age.

Among the natural phenomenon that seemed to offer clues in the search were the saltiness of the ocean, the internal heat of the earth and the rate of deposition of sediments.

It was assumed in the first case that the original ocean was fresh and that salt had been added at approximately the current rate ever since rivers commenced to run, therefore, if we divide the amount of sodium now in the ocean by the amount brought in annually, we have the age of the ocean. The method gives answers of 90 to 180 million years.

It was assumed in the second method that the earth must have cooled from an originally molten condition. Since the approximate rate of cooling and the present temperature can be measured, the entire period of cooling may be calculated. This gives a span of 20 to 40 million years. As an incidental argument it was contended that no known source of heat could have supported the sun's output for much longer than a 20 billion year period and that the earth could not be older than the sun.

Finally, with regard to deposition of sediments it was reasoned that if we determined how many feet of sediment have been laid down and how long it takes a foot to accumulate under average conditions, we may, by simple division, arrive at an estimate of how long erosion and deposition have been going on. Latest figures show that the accumulated maximum thickness of rock laid down since abundant fossils appeared is at least 450,000 feet, or about 80 miles. Although rates of deposition vary from time to time and place to place, an average of one foot in

1,000 years may not be far wrong. At this rate, the fossil bearing sedimentary rock would have taken 450 million years to accumulate.

Although these earlier hypotheses were well conceived and the supporting calculations were mathematically correct, they involved so many unknowns and gave such varied results that no one has much confidence in any of them. It is likely that the seas have always been about as salty as they are now. We know from the presence of thick salt beds that much salt has been returned to the lands from the seas. It is also known that the earth contains its own heat producing radioactive elements which would totally confuse any calculations based on gradual cooling from an original molten state. The heat of the sun is now known to be provided by nuclear reactions, not by ordinary combustion as once was supposed. Finally, the rate of formation of a foot of sediment ranged from thousands of years for limey ooze, to a few hours for riverlaid sand, so that it seems impossible to arrive at reliable rates of deposition. Aside from indicating that periods longer than 6,000 years are needed, these methods still fail to provide a reliable estimate to the age of the earth.

An unexpected method of determining the age of the earth and of specific formations came with the discovery of radioactivity late in the 19th century. Radioactivity is the spontaneous transmutation of one element into

another by the emission of particles from the atomic nucleii. Three types of products are emitted, alpha rays, beta rays and gamma rays. These rays can be detected, counted and measured by suitable instruments such as the geiger counter.

All radioactive elements are subject to disintegration from the moment they come into existence, but a specific atom may disintegrate immediately or it may remain intact for millions of years. The spontaneous behavior of the individual atom is unpredictable and not governed by any known law. Nevertheless, aggregations of atoms, like aggregations of people, are subject to mathematical rules. There is no way we can predict the death of a specific person but we can forecast quite accurately what proportion of a given group will die yearly and how many will be alive at any given time. Hence the potential life of a radioactive atom may be indefinitely long, the total period of activity of a large group of atoms is impossible to predict. It is easier and more meaningful to measure the time interval in which half of the atoms of a large group of specimens have disintegrated. This interval is called the half life, a term widely used in nuclear studies. If half of a certain population has disintegrated in a million years, then half of those remaining will disintegrate in the next million years and so on. At first the decline in abundance of a radioactive material is rapid but later on, as it approaches its end stages the decline is progressively slower.

The half life existence of radioactive elements range from a fraction of a second to billions of years. Many kinds of atoms with short half life periods were probably once common in the universe but have declined to the vanishing point. Others, with longer periods have traveled but a fraction of the way to extinction. Although there appears to have been only one large scale creation of radioactive elements, scientists have created artificially many types of radioactive substances that in general have relatively short half lives.

This concludes the message. Please fill out the response instrument now.

APPENDIX D

MATHEMATICS MESSAGE

MATHEMATICS MESSAGE

We are now ready for Part 2. If you have not finished with Part 1 you may complete the form at the conclusion of Part 2. Please wait to fill out the questionnaire until after you've heard the short message about a recent innovation in education called 'compressed speech.' At the end of the recording take a few minutes to fill out the responses asked for. When you have filled out both parts including the booth number on the first page, please leave the form in the booth. Thank you very much for your cooperation.

There's a distinction between a number and a numeral and on many occasions it is necessary to keep the distinction clearly in mind. If every time we want to talk or think about four plus three, we were forced to say, "The number symbolized by four plus the number symbolized by three," too much time would be consumed and little clarity would result from the mass of words.

In normal writing we use nouns, verbs, adjectives, adverbs, pronouns, phrases, sentences, etc. to express our thoughts. In general, sentences are built of nouns, verbs, etc. Likewise to express our thoughts in mathematics we

need a language which is precise so that another person will know exactly what is being said or written. Just as, "John is a heavy man" is a sentence, so is "Three plus four equals seven" a sentence.

Would "Three plus four equals nine" be a sentence? It has the same form as "Three plus four equals seven." It contains a verb, a subject, and a predicative compliment. But why should your probable reaction, "But it isn't true," have anything to do with whether or not it is a sentence? If we write, "John is 20 years old," and you know that John is 18 years old, does this knowledge deter you from considering, "John is 20 years old" a sentence? Of course not, you say immediately, "That sentence is false." Let us agree that a sentence is either true or false but not both. With this agreement all numerical sentences are separated into two categories, those which are true and those which are false.

The truth of the sentence, "The population of the United States is greater than the population of Canada," can be stated immediately. Is the sentence, "The country's population is greater than that of Canada," true or false? You cannot answer this question because you do not know what country is referred to. Thus, for many English sentences it cannot be stated whether they are true or false, until the objects referred to are specified precisely.

So called verbal problems or worded problems prove troublesome to many people. In many cases, these people realize that they do not know how to attack such problems, that they do not know where to begin. This psychological situation can be overcome if pre-conceived notions are thrust aside and a real attempt is made to understand the ideas involved. Many problems can be solved by using a relatively simple thought sequence.

Many problems are more complicated. Often it is advantageous to introduce one or more variables. We start with a situation described in words and we wish to describe this situation in mathematical language so that mathematics can be used as an aid in finding answers to questions. Naturally, this requires that we understand the written words. For some reason many people feel that they should be able to gain this understanding on a single reading. Such is not the case, even for the experienced worker. A first reading can give only a very general idea of what the problem is about. Then it is necessary to break the problem into parts and to describe each of the thoughts expressed of these parts in mathematical language.

Measurement is common both in everyday experience and scientific work. We measure length or distances in inches, feet, miles, centimeters, etc. Areas enclosed by rectangles and circles may be measured in square feet or square centimeters. Time may be measured in hours or days. A volume

of liquid may be measured in quarts or gallons. Our purpose is to gain real understanding of the basic concepts of measurement, rather than to discuss special units. To do this, it is necessary to spend some time on relationship of real numbers to points on a line, in turn, this calls for a discussion of certain geometric concepts.

In elementary geometry we study interrelationships between points, straight lines, planes, triangles, rectangles, circles, etc. All of us have intuitive notions of what we mean by points and straight lines. We feel we know what is meant when a point on a floor is designated in some fashion or when the edge of a table is referred to as a straight line. While we refer to points and straight lines in geometry we are thinking of idealizations of physical reality. We study these idealizations carefully, logically, in hope that the body of ideas to be developed will have some application to the real world. The most carefully drawn line contains many irregularities and hence is not a line in the mathematical sense, although it may approximate such a line quite closely. A line in geometry is a mathematical model of what is termed a line in the real world. The structure of elementary geometry is a mathematical model of the space in which we exist, or at least a portion of that space.

Points, lines and planes are treated as undefined and certain assumptions are made about them. These

assumptions, or postulates are the basis of the mathematical model. They are actually properties of the things being discussed.

What is the length of a sheet of paper? There are bound to be irregularities in the edges of the sheet caused by the cutting process, so that in actuality there is no such thing as the length of the sheet. However, it is convenient to speak of this mythical true length and we shall do so. A number used as the measure of this true length is in some sense an average of many numbers, each of which is the measure of the length of some mathematical line segment. In practice therefore, uncertainty as to the meaning exists even before measurement begins.

A scale of some sort is used to measure this true length. Take two scales or rulers which are supposedly alike and compare as closely as you can. You will probably find that although they are nearly alike, yet they are not exactly alike due to imperfections in manufacture. These imperfections are bound to introduce a type of error into your measurement. We shall assume that we are using this scale which conforms to suitable standards and hence can disregard this type of error.

When we measure the length of segments we place the zero mark at the scale at one end of the segment. Can the placement of the zero point be exact? Since vision is involved, this alone will make such placement inexact; if

the zero point is placed several times, there is little likelihood that the result will be the same each time.

Finally, a reading on the scale must be made. Here both judgment and vision, neither of which is completely reliable, are involved in determining which mark on the scale is closest to the true length. By reason of the above discussion, an actual measurement may only be an approximation of the true length. Whatever answer is given, error is involved. Not the kind of error due to a mistake made by the operator which is always possible, of course, but error that is inherent in the nature of measurement. Herein lies the vast distinction between a part of the real world and a mathematical model of that part. The mathematical model describes, only in part, the problem of measuring a physical attribute such as length or volume. However, the use of the model considerably enhances our ability to understand the real world, if the model is correctly applied and interpreted. Successful use of a mathematical model depends on correct mathematical operations, say arithmetic or algebra, and correct translations from the real world to the model.

This concludes the message. Please fill out the response instrument now.

APPENDIX E

CONTROL MESSAGE

CONTROL MESSAGE

Group 4

We are now ready for Part Two. If you have not finished with Part 1 you may complete the form at the conclusion of Part Two. Please wait to fill out the questionnaire until after you've heard the short message about a recent innovation in education called 'compressed speech.' At the end of the recording take a few minutes to fill out the responses asked for. When you have filled out both parts, including the booth number on the first page, please leave the form in the booth. Thank you very much for your cooperation.

Title	Time	Album	Company #
1. Tomatoes	2:17	Odd Couple	Dot DLP 25862
2. Room "26"	2:26	Bullitt	WB WS 1777
3. A Song For Cathy	2:10	Bullitt	WB WS 1777
	6:53		

This concludes the message. Please fill out the response instrument now.

APPENDIX F

INTRODUCTORY MUSIC SELECTIONS

MUSIC USED FOR INTRODUCTORY TAPE

Title of Selection	Time	Album Title	Company #
1. Down With The Lights	2:58	Odd Couple	DLP 25862
2. Nothing To Lose	3:27	Odd Couple	DLP 25862
3. Candlelight on Crystal	3:08	The Party	LSP 3997
4. Aftermath of Love	2:45	Bullitt	WS 1777
	11:58		

APPENDIX G

40 ITEM LIKERT-TYPE INSTRUMENT

Respond to the following statements by checking the numbered space which best describes your reaction to the statement according to the following key:

1 - Strongly agree
2 - Agree
3 - Uncertain
4 - Disagree
5 - Strongly disagree

The use of compressed speech materials is relatively unimportant in independent study.

_____ _____ _____ _____ _____
5 4 3 2 1

One of the real disadavantages of using commercially prepared materials, such as the one I heard, is that they must be changed substantially in order to make them relevant to a particular class.

_____ _____ _____ _____ _____
5 4 3 2 1

Before I would consider using compressed speech as a teaching tool, I would want the opportunity to try it out first.

_____ _____ _____ _____ _____
5 4 3 2 1

I would encourage the colleagues in my subject matter area to give strong consideration to the use of compressed speech as an instructional tool.

_____ _____ _____ _____ _____
5 4 3 2 1

Of equal importance to me as an institute participant is the exposure to the newest mediated techniques whose objective is the reduction of dependence on me as the teacher.

_____ _____ _____ _____ _____
5 4 3 2 1

My subject area is one in which speech compression offers a real advantage.

_____ _____ _____ _____ _____
5 4 3 2 1

The cost of developing new media and their applications would be better spent for more faculty.

_____ _____ _____ _____ _____
5 4 3 2 1

Evaluation in terms of cost effectiveness is not a critical issue in determining whether I would use compressed speech materials in my classroom instruction.

_____ _____ _____ _____ _____
5 4 3 2 1

1 - Strongly agree
2 - Agree
3 - Uncertain
4 - Disagree
5 - Strongly disagree

My colleagues and I would be more inclined to utilize compressed materials if we were provided with time to produce them for our students.

_____ _____ _____ _____ _____
5 4 3 2 1

My colleagues could benefit from compressed speech techniques and use them in their classes.

_____ _____ _____ _____ _____
5 4 3 2 1

The greatest advantage of speech compression to a given course is that it transmits more information more efficiently.

_____ _____ _____ _____ _____
5 4 3 2 1

If the media coodinator informed me about compressed speech, I would want to see my colleagues use it before I would.

_____ _____ _____ _____ _____
5 4 3 2 1

Most of the media that I use in my teaching have been adapted from non-teaching situations.

_____ _____ _____ _____ _____
5 4 3 2 1

My prime motivation for using new mediated techniques, such as speech compression, is to discover how to instruct greater numbers of students within the time available to me.

_____ _____ _____ _____ _____
5 4 3 2 1

My department should be encouraged to produced instructional materials such as speech compression messages.

_____ _____ _____ _____ _____
5 4 3 2 1

I want to be able to seek out the media specialist when I need help rather than have him coming to me with suggestions.

_____ _____ _____ _____ _____
5 4 3 2 1

More funds should be directed toward the improvement of existing modes of instruction rather than on the development of new ones such as compressed speech.

_____ _____ _____ _____ _____
5 4 3 2 1

1 - Strongly agree
2 - Agree
3 - Uncertain
4 - Disagree
5 - Strongly disagree

I would be more interested in educational innovations if I could see direct application to my classes.

5 4 3 2 1

A real advantage to my using speech compression is that I can produce the materials myself thereby making the content more relevant to the needs of the students.

5 4 3 2 1

A teacher must discover media for himself before he will "really" use it in his classes.

5 4 3 2 1

If a colleague of mine recommended the technique of speech compression to me, I would plan a lesson around its use.

5 4 3 2 1

The additional expense of producing compressed speech messages is out of proportion to its educational value.

5 4 3 2 1

The media coordinator in our system would have greater impact on the teachers if he would wait until we ask him for help.

5 4 3 2 1

As a media innovator, I would demonstrate speech compression to a professional colleague in his subject area to get his adoption of the idea.

5 4 3 2 1

I can see some real educational value to compressed speech in some disciplines but it just wouldn't work in mine.

5 4 3 2 1

As a content specialist, I agree with the position presented in the compressed speech message.

5 4 3 2 1

Speech compression has a real advantage over the present slower method of disseminating information.

5 4 3 2 1

1 - Strongly agree
2 - Agree
3 - Uncertain
4 - Disagree
5 - Strongly disagree

I would use compressed speech in my classes if I had someone to help me develop and produce my own instructional materials.

5 4 3 2 1

Compressed materials are better understood when they are produced by professional announcers reading from an accurate script.

5 4 3 2 1

Money would be better spent on the improvement of existing methods of instructions rather than on the development of new ones.

5 4 3 2 1

I would use the compressed speech message that I heard today in my classes without change.

5 4 3 2 1

The widespread use of new instructional media, such as speech compression, is contrubuting to a depersonalizing trend on the American college campus.

5 4 3 2 1

I would prefer to know more about compressed speech before I decide whether or not it is appropriate for me to utilize it in a teaching/learning situation.

5 4 3 2 1

A teacher should use his credibility, among the faculty, to influence educational decisions such as the adoption of speech compression.

5 4 3 2 1

The technique of speech compression lends itself almost equally to any course discipline.

5 4 3 2 1

I might be the first one in my school to use compressed speech in my classes.

5 4 3 2 1

1 - Strongly agree
2 - Agree
3 - Uncertain
4 - Disagree
5 - Strongly disagree

Teaching aids which I most often use in my classes were not developed for my discipline but were from non-discipline sources.

5 ____ 4 ____ 3 ____ 2 ____ 1 ____

The technique of speech compression is readily adaptable to my subject area.

5 ____ 4 ____ 3 ____ 2 ____ 1 ____

I would like to know more about the principle of compressed information.

5 ____ 4 ____ 3 ____ 2 ____ 1 ____

Many times I have borrowed techniques from other areas and implemented them into my teaching/learning environment.

5 ____ 4 ____ 3 ____ 2 ____ 1 ____

Please check the appropriate blank:

I first heard about compressed speech today _____, prior to today but during the current term _____, at some previous time _____(please specify)_____.

I do not know what compressed speech is about _____

GO ON TO NEXT PAGE

APPENDIX H

EXPERIMENTAL DIRECTIONS

We are interested in performing research and obtaining data on questions relating to teaching and science institutes designed for this purpose.

The questionnaire attempts to obtain information in three areas:

Personal
Media
Attitude

We shall appreciate your cooperation in helping answer some of the questions which relate to institutes being offered at institutions of higher education.

Since some of the information asked for is of a personal and attitudinal nature, we would like to assure you that your responses will remain confidential. The data will be coded for machine analysis for inclusion in the reporting document but will not be identifiable in any other way.

INSTRUCTIONS

Upon arriving at the listening station, please note the booth location and seat number. Place that number in the space provided:

BOOTH LOCATION _____

Put on the headphones located on the upper left hand side of the booth. Adjust the knob marked PROGRAM to the most comfortable listening level.

1. The music which you hear upon arriving in the lab is background sound designed for your enjoyment.

2. Please leave the headphones on during the experiment as instructions are provided on tape. (If you have difficulty hearing, a lab assistant will help you if you raise your hand).

3. While listening to the music, please answer the questions on the following two pages only.

4. At the conclusion of the music, there will be a short pause. The voice will provide you with instructions and you will be asked to listen to a short message for which you should be prepared to listen carefully.

5. Please do not discuss with others during the experiment.

6. At the conclusion of the recorded message, you will be directed to fill out Part II. Please respond to the questions as asked. Please do not amend the question and respond to its new form. Space is provided at the end for comments. Please feel free to use it. There are no right answers, we are interested only in your responses based on what you have heard and your attitudes toward what you have heard.

Thank you very much for your help.

PART II

DO NOT PROCEED UNTIL REQUESTED TO DO SO.

Dear Institute Participant:

We have now completed the experiment. Thank you very much for your interest and cooperation. May I again reassure you that your responses will be coded for analysis and will be held in confidence.

To partially express my appreciation for your time and effort, I will be happy to provide you with a summary of the results of the study should you wish a copy. In that event, please fill out the information at the bottom of the page and I will see that you recieve a copy.

I would also appreciate knowing what your reactions to the experiment were if you would like to comment. Please feel no obligation to respond further unless you want to.

_____ Yes, I would like to receive a copy of the results

NAME_____

ADDRESS_____

_____

_____ ZIP_____

ADDITIONAL COMMENTS:_____

APPENDIX I

DEMOGRAPHIC DATA FORM

Personal Data

NAME_____ CAMPUS PHONE_____

(Check where appropriate)

TEACHER_____ ADMINISTRATOR_____ OTHER (Specify)_____

AGE 20-29___
30-39___
40-49___
50+ ___

SCHOOL NAME AND ADDRESS WHERE EMPLOYED

_____

_____

PROFESSIONAL AREA OF COMPETENCE_____

YEARS OF TEACHING EXPERIENCE (At your current level)_____

LEVEL OF PROFESSIONAL ACTIVITY (Grades) 1-6_____, 7-9_____, 10-12_____

HIGHEST EDUCATIONAL DEGREE_____ YEAR OBTAINED_____

IF CANDIDATE FOR DEGREE PLEASE STATE DEGREE_____

MAJOR_____

COMPLETION DATE (Approx.)_____

BY WHAT PROCEDURE DID YOU DECIDE TO ATTEND THIS INSTITUTE: (Please X)

_____ personal invitation (by whom)_____

_____ attended previous institute

_____ selected by supervisor

_____ professional improvement

_____ required (by whom)_____

_____ interest in institute goals

_____ other (please specify)_____

What will be the nature of your work with your professional colleagues in September, after the institute experience here at MSU? (Please describe what you will be doing as completely and concisely as possible)

_____

_____

_____

Media Data

Have you ever had a media (audio-visual) course? Yes_____ No_____

If yes, please provide: Total number of media courses_____

List major emphasis of each one (up to five)

_____

_____

_____

_____

_____

Does your school have a media specialist or coordinator? Yes__ No___

Have you ever called upon the media specialist in your system (or building) for assistance? Yes____ No____

Has the media specialist ever called on you with an idea for implementation? (Consider only the case where you did not request him. He took the initiative) Yes___ No___

In your work, have you ever used the following: (please check appropriate column.

	Unfamiliar	Less than 1 a month	Between 1-2 a mo.	1 a week or more
OVERHEAD PROJECTOR	_____	_____	_____	_____
OPAQUE PROJECTOR	_____	_____	_____	_____
16mm PROJECTOR	_____	_____	_____	_____
8mm PROJECTOR	_____	_____	_____	_____
SUPER 8mm CAMERA	_____	_____	_____	_____
TELEVISION CAMERA	_____	_____	_____	_____
LEARNING CARREL	_____	_____	_____	_____
COMPUTER TERMINAL	_____	_____	_____	_____
PROGRAMED TEXT	_____	_____	_____	_____
AUDIO TAPE RECORDER	_____	_____	_____	_____
VIDEO TAPE RECORDER	_____	_____	_____	_____

APPENDIX J

SUMMARY OF DEMOGRAPHIC DATA BY DISCIPLINE

PERSONAL DATA

	Biology	Mathematics	Earth Science
Number of Teachers	18	13	13
Age: 20 - 29	12	3	8
30 - 39	5	7	3
40 - 49	1	1	2
50 and over	0	2	0
Mean Years of Teaching Experience	4.555	6.692	4.230
Level of Professional Activity			
Grades: 1 - 6	0	0	0
7 - 9	3	9	6
10 -12	15	4	7
Highest Educational Degree			
B.S.	12	6	10
M. S.	3	7	3
By What Procedure Did You Decide to Attend This Institute?			
Attended Previous Institute		1	
Selected by Supervisor	1		1
Professional Improvement	14	7	6
Interest in Institute Goals	3	5	6
Have You Ever Had a Media Course?			
Yes	6	6	5
No	12	7	8
If Yes, Please Provide Number			
None	12	7	8
One	6	5	3
Two	0	0	2
Three	0	1	0

	Biology	Mathematics	Earth Science
Does Your School Have a Media Coordinator?			
Yes	7	11	6
No	11	2	7
Has the Media Specialist Ever Called on You?			
Yes	6	10	7
No	12	3	6
Have You Ever Called on the Media Specialist:			
Yes	2	5	3
No	16	8	10

In Your Work, Have You Ever Used the Following:

	Unfamiliar			Less than 1/month			One to two/ months			1/week or more		
Overhead Projector	0	0	1	0	2	1	6	2	5	12	9	6
Opaque Projector	6	1	5	9	7	7	2	2	0	1	3	1
16mm Projector	0	1	2	2	2	8	8	4	2	8	6	1
8mm Projector	11	7	9	3	3	2	2	3	0	2	0	2
Super 8mm Camera	12	9	11	1	4	1	3	0	0	2	0	1
Television Camera	17	9	12	0	2	0	1	1	0	0	1	1
Learning Carrel	14	8	10	2	3	2	1	0	0	1	2	1
Computer Terminal	18	13	13	0	0	0	0	0	0	0	0	0
Programed Text	14	10	7	1	3	2	1	0	2	2	0	2
Audio Tape Recorder	7	6	4	3	2	6	0	4	0	0	1	3
Video Tape Recorder	15	8	12	2	3	0	1	1	0	0	1	1
35mm Camera	14	6	12	1	2	1	2	0	0	1	5	0