ABSTRACT

THE DEVELOPMENT OF A METHODOLOGY FOR IDENTIFYING TENTATIVE THEORY: A STUDY IN THE FIELD OF EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY

By

Laurel Dickerson

This study analyzed conceptual thought in the developing field of educational communications and technology to determine its potential for suggesting tentative theories. To this end, its purposes were: (1) to develop and test a methodology for identifying tentative theories and (2) to apply the methodology in an attempt to identify tentative theories.

Research Methodology. A five-stage analysis procedure was developed to examine data generated by means of a questionnaire. These data were presented in statement form and reflected the relationships between concepts supportive of the profession. Statements were provided by members of the Research and Theory Division, Association for Educational Communications and Technology.

The first stage of analysis identified concept terms (CT, i.e., single word nouns) and concept term phrases (CTP, i.e., single word nouns described or modified by other single words) contained in the respondents' statements. The second stage classified statements into four categories: definition, rule, relationship, and

description. In the third stage, CT's and CTP's which were duplicated, differentiated by singularity and plurality, and represented same or similar meanings were combined. CTP's were then reduced to single nouns called reduced phrases. CT's and reduced phrases most frequently identified in statements were placed on a Frequency of Use List and labelled primary concept terms (PCT) and primary reduced phrases (PRP). The fourth stage of analysis combined statements into groups. PCT's and PRP's were used as foci for clustering CT's and CTP's reflecting general areas of knowledge. Statement groups represented statements containing CT's and CTP's corresponding to the clusters. In the fifth stage, statement groups' potential as tentative theories was evaluated using twelve criteria. To be identified as tentative theories, statement groups were required to meet minimum criteria for explanation, clarification, mediation, commonality, and contemporaneity.

Research Findings and Conclusions.

1. Statements contained 354 CT's and 940 CTP's. This volume reflected the general lack of agreement extant in the professional verbalization of conceptual thought.

2. Respondents provided 298 statements categorized as follows: 110 definition, 60 rule, 97 relationship, and 31 description. The preponderance of definition and relationship statements supported the profession's attempt to define, clarify, and integrate with other concepts its conceptual thought.

3. After combining, 161 CT's, 800 CTP's, and 30 CT/CTP combinations remained. The Frequency of Use List contained one PCT and 76 PRP's. These reflected major foci on the concepts learning, learners/students, technology, instruction and development, process, and systems.

4. Sixty-nine CT/CTP clusters were developed from one PCT and 26 PRP's. Definition of these clusters supported emphasis upon concepts related to learning, learners, technology, instruction and development.

5. Sixty-seven statement groups were developed from the clusters. Of these, 23 were selected for evaluation as tentative theories. No statement group met the requirements for tentative theory; however, explanation and commonality were criteria most frequently met by statement groups. These criteria parallel conclusions for major statement categories: explanation and definition statements reflect the profession's attempt to define itself; commonality and relationship statements suggest the emphasis upon interpretation of language.

Methodological Assessment. The five-stage data analysis appears effective in the following ways:

1. Language analysis was standardized.
2. Major foci of data representing professional thought were identified.
3. The relative strength of data foci was determined.
4. Relationships among concepts contained in statements were defined.
5. The methodology is applicable to additional data from different populations.

The methodology contained the following limitations:

1. The intent of respondent meaning may have been misinterpreted during analysis.
2. A cumbersome mass of data was generated for analysis.
3. Procedures for categorizing statements was not sufficiently extensive.
4. Developing CT/CTP combinations was ineffective in reducing data volume.
5. The requirements for judgmental interpretation could alter future findings.
6. Data provided within statement groups was insufficient to identify tentative theories.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

THE RESEARCH PROBLEM

Background of the Study

The field of educational communications and technology, which recently celebrated its fiftieth anniversary, has yet to attain the sophistication of an established discipline such as psychology or economics. Nevertheless, it has achieved a professional distinction of which the founders can be proud. The educational community readily looks to this field for guidance, direction, and innovation in such areas as telecommunications, instructional improvement, learning techniques, and materials design. Further, its professionals have gained prominence and stature in administration, teaching, instructional development, and research at all levels of education.

While the next fifty years will provide opportunities for even more dynamic contributions, the scope and ultimate impact of the field will largely be determined by the educational community which it serves. The field of educational communications and technology must be prepared to justify its existence as an integral and vital component of education, or risk being designated a lesser priority in crucial planning and budgeting decisions. Without compelling justification, the possibility exists that this new field may be ignored; absorbed by another area of education such as

administration, educational psychology, or curriculum; or extinguished altogether.

To establish and insure a significant role in the future, professionals in educational communications and technology must continue to explore "the field's uniqueness and reason for being" (Norberg and Silber, 1972, p. 2). More importantly, they must develop and display a knowledge base clearly applicable to the field itself, while concurrently relevant to education. The development of any knowledge base includes attention to the development of well-constructed theories.

A Rationale for Theory

Clark (1975), Finn (1953), Heinich (1971a), J. D. Hoban (1973), Merrill (1971), and others from within and without the field of educational communications and technology have noted the necessity of developing a systematic body of theory. The comparative newness of this field can, perhaps, justify the lack of organized theory to date. However, future growth and development will require considerable attention to formulating a firm base of knowledge and supporting theory.

Lack of an organized body of theory is only one of several concerns in the field. A second relates to the origin of the knowledge which supports the field, its activities, and its practices. Current thinking is influenced by the literature and research from such diverse areas as psychology, engineering, sociology, communications, and management. Norberg and Silber (1972) list thirteen

other areas which contribute knowledge to the field of educational communications and technology: learning psychology, perception psychology, psychology of intelligence, social psychology, information science, chemistry, biology, computer science, aesthetics, philosophy, speech, music, and art (p. 17).

While the growth and development of the field are dependent upon knowledge from other disciplines, the unique potential for educational communications and technology must be developed from within. Meierhenry (1971) suggests that "those individuals who understand . . . [the field] should do the necessary theorizing, carry on the necessary research, and develop the appropriate practices and thus develop the appropriate content for the field" (p. 10).

The field of educational communications and technology, while continuing to define and redefine itself and its practices (Davies and Schwen, 1971; Ely, 1972; C. F. Hoban, 1974), has, in the meantime, made substantial contributions to the educational community. New approaches to instructional development, more effective application of existing technologies, promising trends in technological development, and more efficient forms of educational management are representative of the work of the professional today. To a considerable extent, these contributions have produced visible change in educational institutions (e.g., the creation of instructional development agencies). However, the constraints to continued growth are all too apparent. Traditional approaches are used to evaluate professionals within the academic community and to assess

the importance of media and media centers; many faculty members and administrators continue to attend primarily to the "publish or perish" syndrome instead of to instructional excellence; and financial support for media and media-related activities is often reduced or eliminated in times of economic constriction. The evidence is clear that the field has not yet provided the educational community, or itself, with sufficient research and theory to support its practice.

One final issue of primary concern to this researcher is the means by which the field of educational communications and technology transfers its knowledge to new professionals entering the field. The establishment of training programs constitutes a major component of any profession (Finn, 1953), and advanced degrees in educational communications and technology are now awarded by over 30 institutions of higher education (Witt, 1974). The educational community recognizes these degrees as valid evidence of having acquired certain skills and the competence to perform certain tasks. That these programs exist and are given formal recognition in higher education through degree programs is a tribute to the accomplishments of the field, but does raise a number of questions. What is taught in these training programs? From what sources does the content originate? What research supports the teaching of practical skills? What are the perceptions of the educational community in general about what the professional in the field does as a result of these training programs? Do these training programs represent the goals of the profession, and do they assist in evaluating the

effectiveness of fulfilling these goals? Are these goals supportive of the goals of education in general? Finally, is the knowledge transferred to the future professional by these training programs sufficient as a base for future theory construction? While these questions will not be answered in this study, they are among the concerns which generated the impetus for this research.

Purposes of the Study

The purposes of this study are: (1) to develop and test a methodology for identifying tentative theories and (2) to apply the methodology in an attempt to identify tentative theories as they may currently exist in the field of educational communications and technology.

The development and application of a methodology for identifying tentative theory is proposed as a means for examining and evaluating knowledge currently recognized by professionals in the field. Scholarly literature on theory development generally approaches the issue from the point of construction (see Chapter II). As such, it does not speak to the notion of theory construction as a result of an examination of extant knowledge, but rather as a step in the development of the knowledge base. On the other hand, the present study seeks to examine current knowledge in an effort to identify tentative theories.

For the purposes of this study, a primary distinction is made between theory construction and theory identification. While Chapter II deals extensively with the scholarly literature on theory

and theory construction, theory construction is essentially directed toward the creation or revision of a single theory or set of theories. While there are many modes of theory construction, Gibbs (1972) suggests that they all include the following components: major divisions or parts of a theory, basic units of a theory, criteria by which basic units are distinguished by type and identified, rules by which statements are derived from other statements, the procedure for tests of statements derived from a theory, rules for interpretation of the tests, and criteria for assessing the theory (pp. 7-8).

Theory identification is a term which has been developed for this study by the researcher to differentiate between the processes of creating knowledge from the construction of theory and the development of theory supported by an extant knowledge base. As such, theory construction concentrates on the development of a theory or set of theories; whereas theory identification has as its focus a general area of knowledge. Theory identification concentrates on organizing both formal and informal, or experiential, knowledge within a field which, to date, does not recognize the existence of its own unique theory.

The assumption underlying theory identification is that the knowledge base of a particular field has developed to a point where tentative theory can be identified. The process of identification recognizes this knowledge base and seeks, in part, to organize it systematically.

Professionals in the field of educational communications and technology recognize their reliance upon knowledge from other disciplines to provide guidance and direction in practice. But the knowledge used is adapted from these disciplines for purposes unique to the profession (Norberg and Silber, 1972). This adaption suggests possibilities for the development of new knowledge, forming a base from which theories, unique to the field, may exist or eventually evolve.

This study proposes an initial step in the construction of theories. If the field is to achieve the long-term goal of theory development, this development process must be one which supports continued identification, application, and evaluation of sound and cohesive theory. An appropriate place to begin appears to be identifying extant intellectual thought and, possibly, tentative theories currently existing in the field. Until the field knows what knowledge it does have, it will be unable to evaluate that knowledge which exists. To paraphrase J. D. Hoban (1973), we may or may not like what we have, but until we look, we will never know (p. 17).

Rationale for the Study

Finn (1953) noted that "the most fundamental and most important characteristic of a profession is that the skills involved are founded upon a body of intellectual theory and research" (p. 8). That this body of intellectual theory and research has yet to be fully established for the field underscores the need to identify, if

possible, even tentative theories supporting intellectual development and practice in the field today.

The professional concern for the development of a systematic body of theory has been reported and emphasized by scholars within the field of educational communications and technology. However, little is written supporting the rationale for this concern. It would appear that there are at least three purposes served by theory: (1) the existence and recognition of a systematic body of theory provides a basis for the creation and development of new knowledge; (2) theory assists in fulfilling the purposes of scientific knowledge; and (3) theory facilitates the transmission and interpretation of knowledge. These purposes are explained below.

First: <u>The existence and recognition of a systematic body of theory provides a basis for the creation and development of new knowledge</u>.

In 1953, Finn noted that

> without a theory which produces hypotheses for research, there can be no expanding of knowledge and techniques. And without a constant attempt to assess practice so that the theoretical implications may be tested out, there can be no assurance that we will ever have a theory or that our practice will make sense (p. 13).

Theories assist the researcher in assessing what is known within a body of knowledge. Further, theories support the decision-making process regarding the kind of research needed about the body of knowledge. Dubin (1969) distinguishes between two kinds of research: empirical research, which implies the testing and validation of a particular theory or group of theories, and theoretical

research, which implies the development of theory leading to the creation of new knowledge.

Dubin (1969) further distinguishes between research and description. Research, as in the conduct of scientific inquiry, implies the existence of a systematic body of theory. Information is gathered and used to measure the values associated with units of a theory (p. 6). Description, however, is the reporting of an experience whereby no theory is implied since "information [is] gathered for its own sake" (p. 6). C. F. Hoban (1973) appears conscious of this distinction when he notes his concern for the field's ability to construct a unified multimedia theory from current "efforts to develop systematic theoretical foundations of individual media" (p. 15). Recognized and systematic theory provides a base from which to measure the meaning and the value of new data, a method through which theory can be incorporated effectively into an existing body of knowledge, and a mechanism for fitting new data to any established pattern.

Second: Theory assists in fulfilling the purposes of scientific knowledge. Briefly, these purposes include providing a topology or classification system for knowledge, a means of predicting future events, a mechanism for explaining events, a basis from which to understand and to describe events, and the potential for controlling events in the future (Reynolds, 1971). While these purposes of scientific knowledge can be used as guidelines for organizing and evaluating a knowledge base, theory must ultimately exist to fulfill them. For example, professionals in the field of

educational communications and technology presently engage in what this researcher calls "reactive evaluation." Action is initiated and then the effectiveness of that action is evaluated. A sound body of theory would provide predictive abilities and causal understanding before action is taken.

Third: Theory facilitates the transmission and interpretation of knowledge. A systematic body of theory allows extant knowledge to be condensed for more effective transfer. This condensation provides for efficient and effective management of the learning process. Finn (1955) implied the necessity of theory building to condense information while speaking to the issues raised by the knowledge explosion. At the time, his primary interest was in the development of "an organized and systematic attack on existing and nascent knowledge" (p. 245) in the field so that the knowledge could be communicated.

A crucial justification for theory is its ability to assist the learner in interpreting information and relating it to relevant areas within the knowledge base. When theory exists, new information can be categorized and its meaning and relevance to the knowledge base determined. This process of understanding new information can be compared to a theory of learning proposed by Ausubel (1963). Essentially, Ausubel is concerned with the individual's ability to comprehend, learn, organize, and remember large volumes of verbal information presented in an educational setting. J. D. Hoban (1973) notes that Ausubel's theory of learning has as its basic assumption the existence of

> a cognitive structure . . . which is hierarchically organized . . . with each concept linked together through a process of subsumption. As a result of this subsumption process, new material can enter the cognitive field and be subsumed under a related and more inclusive conceptual system (p. 114).

An example of this subsumption process and the ability to interpret information can be seen in the learning of the Pythagorean Theorem. Absorbing the knowledge contained in the postulates and applying it to the solution of the area of any right triangle is far more difficult without the formula, $a^2 + b^2 = C^2$. This formula, a mathematical statement of the theorem, ultimately provides a structure for understanding the axioms and applying the knowledge of them.

Further support of the rationale for the present study is provided by scholars in the field of educational communications and technology. In 1953, Finn addressed the issue of the audiovisual field as a legitimate profession. He outlined six criteria (and added a seventh in 1956) which a field must meet before it can be called a profession.

1. An intellectual technique requiring reflective thinking and including critical evaluation methodologies, visualization of abstract ideas, planning, and administration.

2. The application of this technique to practice.

3. An intensive and substantial training period for its professionals.

4. An association for the membership to provide a high quality of communications between the members of the profession.

5. A code of ethics and standards for practice which are enforced.

6. "An organized body of intellectual theory" (p. 7) constantly expanded by research.

7. The ability to exercise its own leadership.

Finn's evaluation of the field's ability to meet these criteria noted that the major weakness of the field lay in the lack of an organized body of theory. The result was that the field could not yet exercise its own leadership. Intellectual leadership was provided from professionals outside the field. As such, Finn concluded, the field had not at that time achieved true professional status.

Other scholars in the field of educational communications and technology have also spoken to the issue of theory. In an attempt to define instructional development, Heinich (1971b) noted that its practice should employ a prescriptive approach, represented in theories of learning. The problem, Heinich (1970) explained, may be that theories are not verifiable. J. D. Hoban (1973) pointed out that "many useful principles . . . have at least partially [been] verified by researchers" (p. 20) and cites, among others, the work of Hilgard, Gagné, and Shalock.

Merrill (1971) forthrightly called for a theory-based approach in his discussion of instructional development. His concern is that this area of educational communications and technology reacts to "raw empiricism" as a basis for practice. Briggs (1971), on the other hand, expounds the virtues of the empirical over the theoretical approach, but notes that "in order to improve our theory . . . we must continuously re-examine our present practices and conduct research to improve the technology" (p. 69).

Clark (1975), in speaking to the issue of media research, says that reviews of research "generally conclude that we have produced very little in the way of useful research questions or a body of generalizable knowledge" (p. 197). Clearly the literature in the field of educational communications and technology supports the need for a body of theory.

Coupled with the scholarly demand for theory is the problem of fragmenting goals and interests. The structure of the national professional organization for the field demonstrates the reality of this problem. Representing approximately 8,000 members, the Association for Educational Communications and Technology is subdivided into nine divisional organizations, more than six affiliates, and various ad hoc committees, councils, task forces, and editorial boards. Professional personnel in the field include public school media specialists, librarians, instructional developers and designers, professors and teachers, military training specialists, and administrators. The divergent concerns and realities of these professionals are notable. A sound body of theory might assist to provide a basis for evaluating whether or not the profession is as fragmented as its professional interests might indicate. A body of theory recognized as valid by the membership would indicate only superficial, rather than fundamental, fragmentation, whereas the lack of agreement on or acceptance of a general body of theory would indicate serious conflict of goals and purposes within the field.

Relevance of Knowledge and Theory to the Field

The integral components of a knowledge base are theories. Clearly, the task of establishing a knowledge base is not easily accomplished by any developing discipline; and problems surrounding the development of theories, especially in the social sciences, are particularly acute. The social scientist is continually confronted with issues imposed by social laws, the value-oriented biases of social scientific inquiry, and the subjective nature of the social sciences themselves (Nagel, 1961).

However, as previously noted, the purposes served by scientific knowledge can be applied to the social sciences as well. The field of educational communications and technology might find the application of these purposes to be useful guides in the process of developing and assessing its own base of knowledge. The purposes of scientific knowledge are aptly summarized by Reynolds (1971):

1. TO PROVIDE A TYPOLOGY OR CLASSIFICATION SYSTEM FOR THE KNOWLEDGE. This typology should be exhaustive and mutually exclusive. All components and elements should have a justifiable and logical place in the knowledge base.

2. TO PREDICT FUTURE EVENTS. Based on theoretic constructs, events and occurrences should be able to be predicted. Predictive ability is not based on the element of time so that the standards applied to future events are also applicable to past and present events.

3. TO EXPLAIN EVENTS AND OCCURRENCES WITHIN THE KNOWLEDGE BASE. The ability to explain should be justifiably and logically based on past as well as future events. Explanation of events and occurrences are viable for any point in time.

4. TO PROVIDE A SENSE OF UNDERSTANDING ABOUT THE KNOWLEDGE. While this criterion is an extension of the ability to explain, it is also a way of elaborating on the cause of the event as well as a way of describing it.

5. TO PROVIDE THE POTENTIAL FOR THE CONTROL OF EVENTS AND OCCURRENCES. Reynolds notes that "the issue is one of making a distinction between understanding how certain variables affect one another and being able to change the variables. In order to control events in a particular fashion, it is necessary to meet both conditions" (p. 10).

The following discussion attempts to relate these purposes to the field of educational communications and technology.

Typology. In considering the organization and classification of the knowledge base, one can cite categories such as instructional development, materials production, media utilization, and learning resources management as examples. Another way of viewing the field might be through the disciplines which have contributed to its development and assisted in improving its practice, e.g., learning psychology, management, engineering, and communications. A typology might, at first, be suggestive of general taxonomies whereby the field establishes unique areas of emphasis based upon a combination of the above practices and disciplines.

Prediction. Any issue of Audiovisual Communication Review provides a summary of research conducted on some aspect of media utilization. Although no one research study or any single technique exists which predicts occurrences in a particular situation, the professional does generalize about learning situations. It is, perhaps, a combination of past experiences, intuition, and research

which predicts, for example, that effective utilization of media implies planning, adequate physical facilities, and classroom management. Such generalizations also exist in instructional development and media design and management. While scientific prediction based upon thorough research and testing procedures has not yet surfaced to provide the field with a formal body of theory, past experience and common sense do provide generalizations which may serve as a basis for further scientific research.

Explanation. The ability to explain is based not only on available data but also on the ability to predict as a result of the data. While explanation may exist for any particular situation, there is no guarantee that the explanation will suffice for that same outcome in a similar situation at a different time. Nevertheless, experience and common sense provide, to a certain extent, the skills for determining probable cause. For example, in the client-developer relationship, the first meeting appears to be crucial for establishing the relationship between the two persons (Davies, 1975). While the instructional problem may be the same in similar situations, differences in client motivation, the political environment, and the personalities of the client and the developer may greatly affect the process of instructional improvement. The field is able to provide only general suggestions as to techniques for establishing and maintaining the relationship; but the components of the process vary greatly and the professional developer is provided with little, if any, validated, generalizable explanation for managing that process.

Understanding. Reynolds (1971) notes that the "sense of understanding is provided only when the causal mechanisms that link changes in one or more concepts (the independent variables) with changes in other concepts (the dependent variables) have been fully described" (p. 7). Loosely defined, the independent variables in the example described above would probably be the differences in client motivation, political environment, and personality. The dependent variable might be the instructional problem or resulting client/developer relationship. To truly understand the problem-process-output in this situation, one would have to describe, at least partially, the cause of the changes in the dependent variables.

Control. While Reynolds does not treat the concept of control as a "necessary criterion for accepting knowledge as scientific" (p. 10), he does assume that "if a theory related to a particular phenomenon is scientifically useful, the scientists . . . can examine their ability to influence the variables that will affect the events they wish to control" (p. 10). Returning to the example, Davies (1975) emphasizes the importance of the first meeting between the client and the developer in order to establish a satisfactory working relationship. This emphasis is an indicator of attention to this control. The field of educational communications and technology has as its goal facilitating "human learning through the systematic development, utilization and management of learning resources" (AECT, 1974, p. 9). The term "systematic" implies provision for control.

One final comment should be made on the relationship between the social sciences and the field of educational communications and technology. Neither area has an organized body of theory which can withstand the rigor of assessment when the criteria for scientific knowledge are applied. While the natural sciences have, over time, produced a concrete body of theory, the social sciences have yet to develop such a base of knowledge. Most theoreticians adhere to the notion that this problem will be resolved (Dubin, 1969; Gibbs, 1972; Reynolds, 1971), but other problems exist which would appear to hinder the development of a sound body of theory. Nagel (1961) notes that

> most of the 'social theory' that has emerged . . . in the past, as well as the present, is social and moral philosophy rather than social science, and is made up in large measure of general reflections on the nature of man; justifications or critiques of various social institutions or outlines of stages in the progress or decay of civilizations . . . they rarely pretend to be based on systematic surveys of detailed empirical data concerning the actual operations of societies (p. 447).

Reynolds (1971) is equally critical in his assessment of the output of social scientists. In particular, he notes the problems of

> achieving complete objectivity in dealing with social phenomena, particularly when related to sensitive issues, and . . . [the] ethical considerations that prevent the use of certain types of research procedures or require more expensive alternatives . . . . However, despite these many problems, the major factor that thwarts the development of a scientific body of knowledge of social and human phenomena is the character of social scientists themselves . . . [the] lack of clarity in theoretical writings and ignorance about what scientific knowledge should look like and how it is created (p. 163).

Overcoming these problems is clearly an important component in developing theory. To extend Reynolds' thinking, an examination of the nature of the knowledge currently perceived to exist in the field of educational communications and technology is necessary.

Assumptions of the Study

The present study rests on two major assumptions. The first is based on the proposition that indigenous knowledge in the field of educational communications and technology exists. No value judgment is made initially as to whether or not this knowledge meets the criteria for scientific knowledge. The second assumption concerns the persons selected to provide information on the knowledge base in the field of educational communications and technology. It is assumed that, by virtue of their membership in the Research and Theory Division of the Association for Educational Communications and Technology, these persons represent the best subpopulation within the profession to provide this data.

Definition of Terms

The following terms will be used throughout the course of this study:

Educational Communications and Technology. An emerging field within education and the social sciences composed of professionals in the areas of instructional design and development, educational media management, materials design and production, information systems, and media utilization. Practitioners work in

higher education, public school systems, industry and business, and government.

Association for Educational Communications and Technology. A national professional organization representing the professionals, para-professionals, and students in the field of educational communications and technology.

Research and Theory Division. An organization of members within the Association for Educational Communications and Technology specifically interested in research and theory for the purpose of producing data-based knowledge to improve the quality and quantity of production, utilization, and development activities in the field of educational communications and technology.

Knowledge/Knowledge Base. That information, data, and body of theory and thinking which supports professionals and the intellectual development of a field. Generally represented by the literature, research, and skills of the practitioners and researchers in the field.

Theory. A model of a part of the observable world describing an event or occurrence and how it works. Theories are "holistic in that they put together both structure and function into closed systems whose characteristics are the consequence of the elements composing the system and the laws by which the elements interact among themselves" (Dubin, 1969, p. 223).

(While reviewing the literature, the researcher found the terms "theory" and "scientific knowledge" to be used interchangeably. A distinction between these terms is found in Chapter II for

purposes of organization; but this distinction is structural, not functional, in nature.)

Body of Theory. Generally recognized as organized and/or systematic in nature; collection of data, resulting from scientific research, which form theories and constitute a major component of the knowledge base.

Concept Term (CT). A single word noun representing a concept.

Concept Term Phrase (CTP). A single word noun accompanied by adjectives, descriptors, and/or modifiers and representing a concept.

Primary Concept Term (PCT). A concept term which has been combined with other same or similar concept terms and which appears four or more times in the list of concept terms and concept term phrases identified from statements submitted by respondents to a questionnaire developed for this study.

Primary Reduced Phrase (PRP). The single word noun in a concept term phrase which has been combined with other same or similar concept term phrases and which appears four or more times in the list of concept terms and concept term phrases identified from statements submitted by respondents to a questionnaire developed for this study.

(A Reduced Phrase is the single word noun in a concept term phrase which has been combined with other single word nouns from same or similar concept term phrases.)

Cluster Area. Four or more concept terms and/or concept term phrases, identified in statements containing primary concept terms and/or primary reduced phrases, which are the same or which form relationships among each other.

Overview

Chapter I has presented the background for the study. This presentation has included a rationale for theory, purposes of the study, and a rationale for the study. Also included in this chapter was a discussion of the relevance of knowledge and theory to the field of educational communications and technology, assumptions of the study, and definition of terms to be used throughout the remaining chapters.

A three-part review of selected literature is presented in Chapter II. This review includes a discussion of theory and science, theory and the social sciences, and theory and the field of educational communications and technology as it relates to theory identification. The research design and methodology procedures developed for identifying tentative theories are presented in Chapter III. The findings of this study are reported in Chapter IV. A discussion of the research methodology, conclusions, recommendations, and observations drawn from this study are presented in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

In reviewing the literature, focus was placed on three general areas of relevance to this study. The first concentrates on science, scientific knowledge, and the nature of theory. The second general area focuses on a review of social science, how it differs from natural science, and the problems seemingly inherent in the conduct of research and the construction of theory. The third area focuses on the theoretical concerns extant in the field of educational communications and technology and the nature of its knowledge.

While reviewing the literature, it became apparent that the writings of both the scientific and social scientific communities apply directly to the field of educational communications and technology. Also, the literature representing the field is replete with references to scholarly writings generally attributed to these other communities. The result of these observations can be presented graphically by a pyramid of literary works (Figure 1) indicative of the field's attention to science and social science. This pyramid represents both the development of organized knowledge and the origins of thought supporting the field today. The literature which speaks to theory construction in natural science can be

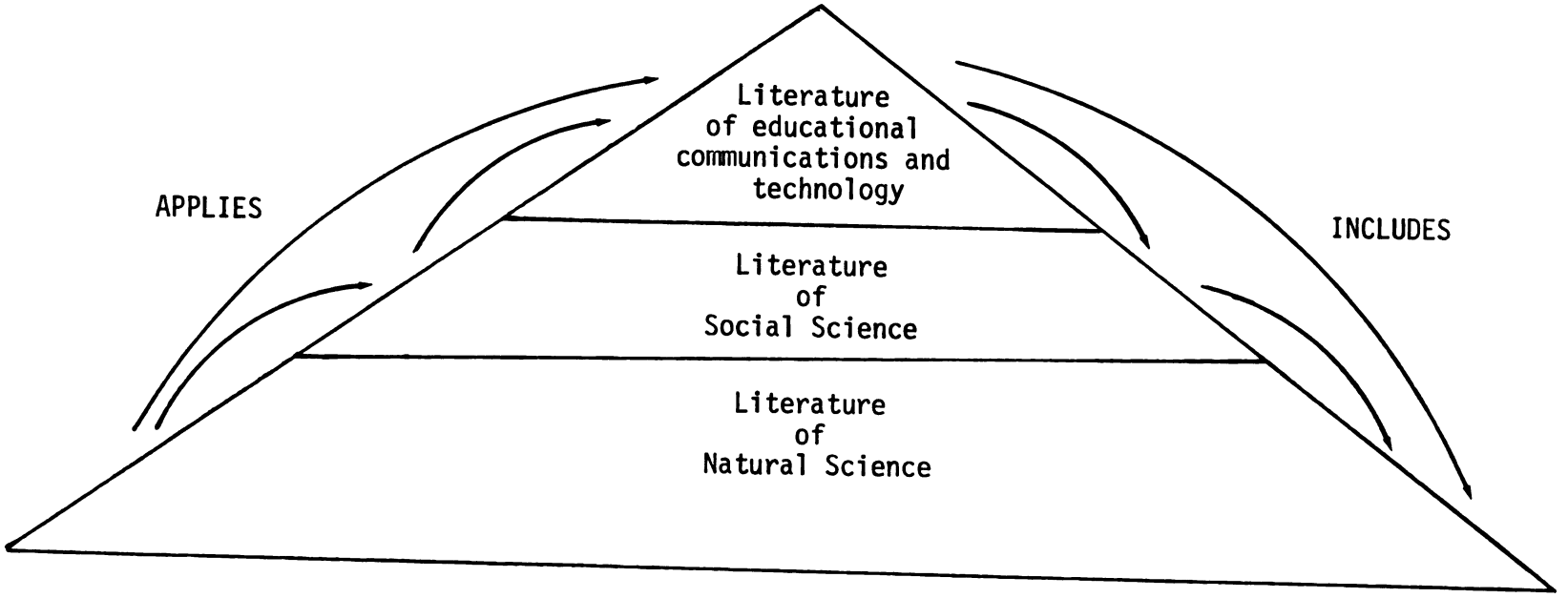


Figure 1.--Pyramid of Literature.

applied to both social science and the field. Likewise, scholarly writings in the field of educational communications and technology make reference to the work of authors in social science and natural science in the areas of theory and knowledge.

The organization of this chapter is consistent with this pyramid, showing the relationship among the literature of science, social science, and the field. The first section presents a review of selected scholarly writings by authors whose work attends to the nature of science and theory. The second section provides a discussion of social science, focuses on some of the distinctions made between it and natural science, and presents some of the problems extant in the development of theory. The final section of this chapter looks at the field of educational communications and technology and its relationship to and concern about theory.

Science and Knowledge

One cannot develop a review of this area without first considering the rationale for science itself. Dubin (1969) explains that

> the explicit goal of science is to model the sensory world of man in terms of his perceptual skills and for the purposes he defines as his needs for practical knowledge or simply for comprehension to satisfy his current curiosities (p. 231).

Nagel (1961) offers a summary of scientific accomplishment by emphasizing "the achievement of a generalized theoretical knowledge" (p. vii) about events and processes and the conditions which attend their occurrence. He further suggests that science

has contributed to the development of "logical methods for assessing . . . the merits of alternative assumptions concerning matters of fact or of desirable policy" (p. vii).

Science has further contributed to knowledge through scientific research. The focus of this research provides the framework for all major areas of inquiry. While speaking specifically of his Paradigm Theory, Kuhn (1970) explained this focus as determining classes of facts, demonstrating agreement between nature and theory, and explaining and describing the theory (p. 27).

Characteristics of Scientific Knowledge

Reynolds (1971) provides a succinct description of the characteristics of scientific knowledge. First, knowledge must be independent of time and space, i.e., it must be abstract. This characteristic is the cornerstone for predicting and explaining events. It also supports the efficient use of knowledge. Second, scientific knowledge is characterized by its intersubjectivity. "Shared agreement among relevant individuals on the events . . . encompassed by a concept . . . and the relationship between concepts specified by one or more statements" (pp. 15-16) must be present. The agreement on events implies an explicitness of description and a consensus on the meaning of the events. Agreement upon relationships between concepts implies the judicious use of "logical systems that are shared and accepted by the relevant scientists to insure agreement on the predictions and explanations of the theory" (p. 18). A final characteristic presented by Reynolds is that of

empirical relevance. "The possibility should always exist that other scientists can evaluate the correspondence between the theory and the results of empirical research" (p. 18).

Popper (1968) further characterizes knowledge in his discussion of the psychology of knowledge and the logic of knowledge. He distinguishes between the process of conceiving a new idea (psychology of knowledge) and the methods and results of examining it logically (p. 31). The psychology of knowledge concentrates on empirical information, whereas the logic of knowledge is concerned with logical relations which exist within the knowledge and the justification or validity of a theory (pp. 30-31).

Popper's (1968) primary interest lies in the logic of knowledge and empirical science which, for him, distinguishes science from metaphysical ideas. He emphasizes that knowledge which represents empirical science must fulfill specific requirements. It must be synthetic, that is, representative of a possible world; it must represent a world of possible experience, i.e., it must not be metaphysical; and it must be distinguished from other systems such as "the one which represents our world of experience" (p. 39).

In speaking of scientific thought, Nagel (1961) presents a most adequate summary of scientific knowledge:

> Scientific thought takes its ultimate point of departure from problems suggested by observing things and events encountered in common experience; it aims to understand these observable things by discovering some systematic order in them; and its final test for the laws that serve as instruments for explanation and prediction is their concordance with such observations (p. 79).

Scientific Knowledge and Common Sense

Before turning to the topic of theory specifically, it is worth noting the distinctions which Nagel (1961) makes between scientific knowledge and common sense. In so doing, further understanding is provided of the nature of science. In addition, it previews some of the concerns surrounding the development of theory in social science.

1. [Science] is the desire for explanations which are at once systematic and controllable by factual evidence that generates science . . . . It is the organization and classification of knowledge on the basis of explanatory principles that is the distinctive goal of the science (p. 4).

2. [Common sense] seldom is aware of the limits within which its beliefs are valid or its practices successful . . . [and] is most adequate in situations in which a certain number of factors remain practically unchanged. But since it is normally not recognized that this adequacy does depend on the constancy of such factors . . . common sense knowledge suffers from a serious incompleteness (p. 5).

3. The . . . inconsistencies that so frequently mark common beliefs are notably absent from those sciences in which the pursuit of unified systems of explanation has made considerable headway (p. 7).

4. Common sense is general in its language system and extremely hard to test. But while science is more precise and thus easier to test, it is also easier to refute (p. 9).

5. [Common sense knowledge] is largely concerned with the impact of events upon matters of special value to men . . . [science, however, is] the quest for systematic explanations [which] requires that inquiry be directed to the relations of dependence between things irrespective of their bearing upon human values (p. 10).

6. Common sense beliefs are not subjected, as a matter of established principle, to data secured for the sake of determining the accuracy of those beliefs and the range

> of their validity. [This is not to say that the information surrounding common sense is false. It is not necessarily testable, nor tested experimentally] (p. 12).

Theory

It is relevant first to provide definitions of theory because of the implications these have for the final section of this chapter. In so doing, it becomes apparent that three concepts are outstanding in their commonality to these definitions and also to the field of educational communications and technology. The commonality among these definitions is reflected by the concepts representing the relationship of one thing to another, the systematic way in which the relationship exists, and the process by which the relationship is determined. Accordingly, representative definitions are as follows:

> Theories are the explanatory statements or systems which are devised by man as descriptions and interpretations of the findings of his scientific investigation (DiRenzo, 1967, p. ix).

> A theory is a systematically related set of statements, including some lawlike generalizations, which is empirically testable (Rudner, 1969, p. 31).

Dubin (1969) notes that a theory is a model of a part of the observable world describing the phenomenon and how it works. He further explains that

> scientific models are holistic in that they put together both structure and function into closed systems whose characteristics are the consequence of the elements composing the system and the laws by which the elements interact among themselves (p. 223).

Snow (1973) posits that "a theory is a symbolic construction designed to bring generalizable facts (or laws) into systematic connection" (p. 78).

Components of Theory

Review of the components of a theory paralleled those of scientific knowledge. Consistent with Nagel (1961) and Popper (1968), Snow (1973) explains the components as

> a set of units (facts, concepts, variables) and . . . a system of relationships among the units. These are defined and interpreted in statements that are understandable to others and that make predictions about empirical events (p. 78).

Gibbs (1972) provides further insight. He notes that all theories must contain a logical interrelationship of the component statements and that differentiation must exist between definitions and empirical assertions within the theory.

Functions of Theory

A review of the functions of theory does not reveal such compatibility of scholarly thought. For example, Reynolds (1971) notes that theory "attempts to describe an idea" (p. 43). Heinich (1970) says that "theories bind together systems of postulates and laws" (p. 60). And Dubin (1969) explains that theory "is concerned with modeling the processes and outcomes of particular units interacting in systems" (p. 33).

Heinich's (1970) elaboration of the functions of theory provides the highlights of both agreement and disagreement among various scholars concerning those functions. Heinich says that

theories "explain related phenomena in a systematic fashion . . . [and] generate strategies for research" (p. 62). Rudner (1969) would agree with the systematic explanation of related phenomena (pp. 53-54) and Stinchcombe (1968) concurs regarding the generation of strategies for research: "Theory ought to create the capacity to invent explanations" (p. 3).

Heinich's (1970) differentiation between experimental laws and theory provides a basis for examining scholarly disagreement. In distinguishing between the two, Heinich calls attention to the problem of prediction:

> Many behavioral scientists do not realize that experimental laws, not theories, predict with certainty . . . . They frequently misunderstand that the functions of theory in the natural sciences do not include prediction of specific events (p. 61).

According to Rudner (1969), however, one of the most important functions of theory is prediction (p. 53). Gibbs (1972) supports Rudner's contention in his discussion of the criteria for assessing theory. He notes that "predictive power should be the primary criterion for assessing theories" (p. 4).

Characteristics of Theory

The characteristics of theory parallel those of scientific knowledge. Dubin (1969), Gibbs (1962), Nagel (1961), Rudner (1969), Snow (1973), and others present agreeable explanations, which, in summary, provide for

> an abstract calculus that is the logical skeleton of the explanatory system . . . a set of rules that in effect assign an empirical content to the abstract calculus . . . an interpretation or model for the abstract calculus (Nagel, 1969, pp. 90-106).

The following elaborates on what Gibbs (1972) explains as the "extrinsic" part of a theory; Nagel (1961) terms an "abstract calculus"; Rudner (1969) calls an "abstract syntactical system"; and Snow (1973) seems to describe as "metatheory" and a "calculus."

The following discussion is taken from Rudner (1969). The full formalization of a theory includes a purely formal system "in which meanings (if any) that the elements may have had associated with them are disregarded" (p. 36).

Rudner further expands his notion:

> A purely formal system or calculus may be construed as a generated (or generatable . . .) language to whose elements meanings are not assigned, or the meanings of whose expressions, if they antecedently have meanings, are completely disregarded (p. 35).

The primary characteristics of this formal system include: a class of primitive or undefined elements; a class of syntactical rules linking primitive elements into more complex expressions and for transforming complex expressions into other expressions; a class of expressions called axioms developed from primitive elements; a set of definitions introducing new elements into the system, which are defined in terms of the primitive elements; and theorems, a set of expressions derived by transformations on the axioms (p. 35).

Elaboration is offered in Rudner's discussion of the syntax of a system.

> First, there are the formation rules which specify what combinations of the primitive elements are permissible combinations. Second, there are the transformation rules which prescribe what permissible transformations can be wrought on permissible expressions in order to obtain other permissible expressions . . . the theorems of a system are derived by application of the transformation rules to the axioms of the system (p. 36).

Gibbs' (1972) extrinsic component is similar to Rudner's abstract syntactical system in the characterization of theory. Gibbs notes that this component includes the definition of intrinsic terms with "formulae, procedural instruction, specification of kinds of data" (p. 7).

Snow's (1973) formal system of theory would contain a calculus explained as "a set of equations or logical formulae that specify operations performed on variables in the language of the theory" (p. 82). He presents an additional characteristic, that Rudner would subsume under his syntactical system, called presumptive hypotheses or axioms. These are "explicitly stated postulates without direct evidential support from which empirically testable theorems can be derived" (p. 82).

Snow (1973) introduces a metatheory which, while focusing upon the activities surrounding the actual nature of theory, directly relates to the formal system of theory. He explains that a metatheory provides for a "grammatical structure within which a theory can be developed or stated" (p. 80).

Two additional characteristics provide a sort of conceptual closure for the total notion of theory. The calculus, or syntactical system, is followed by what Nagel (1961) terms a "set of rules," Rudner (1969) calls "semantical rules," and Snow (1973) describes as a "dictionary of empirical definitions." In effect, these terms represent the bridge between the calculus and the contextual meaning of the theory itself. Their purpose is to provide the basis from which the interpretation of meaning is generated.

Theory Construction

Dubin (1969) is precise in his focus on theory construction:

> The central issue in theory building is to know the materials out of which a scientific theory is built and the manner in which these components are articulated with each other . . . this is essentially a descriptive knowledge (p. 237).

Snow (1973) discusses theory construction in terms of three approaches: an inductive approach, an interactive or functional approach, and a deductive approach. The inductive approach emphasizes the acquisition of data and the development of generalizations. In this approach, the theory preceded the data-gathering activities. The interactive or functional approach is eclectic in that the theoretical concepts and the data-gathering activities interact in the process of construction. The third approach is deductive. "The theory is formally constructed from massed data; its mathematical and logico-deductive structure is elaborated; a program of research is conducted to test derived hypotheses; and findings are used to make improvements in the theory" (p. 87).

Gibbs (1972) explains that, generally, the literature on theory construction deals specifically with a particular theory, but that a general mode of formal theory construction is apparent. The mode is descriptive of the entire process and stipulates major divisions or parts of a theory, basic units of a theory, criteria by which basic units are typed and identified, rules by which statements are derived from other statements, procedures for tests of statements derived from the theory, rules for interpreting the tests, and criteria for assessing the theory (pp. 7-8). Gibbs

adds that a "formally constructed theory is one in which the components are differentiated and identified systematically, with argumentation excluded" (p. 7).

While the literature is replete with suggestions on developing theory (Dubin, 1969; Kuhn, 1970; Nagel, 1961; Popper, 1970; Reynolds, 1971; and others), perhaps Bennis (1975) best explains the process:

> Undoubtedly, the building of knowledge goes on in this way. Otto Neurath, the mathematician, once compared the development of science to a man repairing a leaky boat. As he patches up one side while standing on the other, dry side, the latter starts leaking, so he shifts over to the new dry side, and so on and so forth. If such jerky rhythm and patchwork characterize most knowledge building, then in any reversal of emphasis . . . exaggeration of and inattention to some factors inevitably occur. After any revolution in thought, the debris--in terms of fads, unsubstantiated theories, and overstatements--has to be put in perspective and incorporated into more formal theory (pp. 321-322).

Testing Theory

"A theory is not a theory unless it can be disproved. That is, unless it can be falsified by some possible experimental outcome" (Platt, 1967, p. 350). "So long as a theory withstands detailed and severe tests and is not superseded by another theory in the course of scientific progress . . . it is corroborated by past experience" (Popper, 1968, p. 33). Popper (1968) explains that corroboration is a "neutral term to describe the degree to which a hypothesis has stood up to severe tests" (p. 251).

In 1889, Chamberlain discussed the historical approach to the testing of theory. He explained that in the early days of

intellectual development, the "wise man" tended toward explaining and interpreting phenomena before "serious inquiry into the phenomena itself" (p. 2) took place. This led to the development of tentative theories used to generally explain many phenomena. What followed was a search for facts supportive of the theory (p. 2). Chamberlain noted that the result was

> a pressing of the facts to make them fit the theory . . . . The search for facts, the observation of phenomena and their interpretation, . . . were dominated by affection for the favored theory until it . . . [appeared] to its author or its advocate to have been overwhelmingly established (pp. 2-3).

Platt (1967), in his discussion of strong inference, called attention to the problem-oriented scientist. As opposed to the method-oriented scientist who deals with only one theory or experiment, the problem-oriented approach requires a willingness on the part of the scientist to repeatedly "put aside his last methods and teach himself new ones" (p. 351).

Dubin (1969) makes a further distinction in the kinds of testing required in the conduct of research by noting that theoretical research is designed to build theory and empirical research is designed to test the theory (p. 240).

Popper (1968) elaborates on the methods of theory testing. There are four basic methods used:

1. A comparison of the conclusions of various tests to determine internal consistency;

2. Determination of the character of the theory; an investigation of the nature of the theory to determine whether or not it meets the criteria of an empirical or scientific theory;

3. A comparison of the particular theory under study with other theories to determine the existence of a scientific advance;

4. An empirical application of the conclusions of the theory (pp. 32-33).

In support of Popper's basic methods of testing theory, Dubin (1969) presents two types of tests. The first is the logical test of truth whereby the "truth of the statement rests upon its logical congruence with the conditions" (p. 240) of the theory about which the statement is made. The second type is the empirical test of truth designed to determine if the theory adequately represents its empirical domain. The empirical test is designed to improve the theory under study or to prove the theory valid or invalid (pp. 240-241).

Social Science and Theory

The literature reviewed on the nature of theory in social science presents various distinctions which are made between social science and natural science. Distinctions presented by Dubin (1969) and Heinich (1970) assist to define assorted problems seemingly inherent in the conduct of social scientific inquiry.

Dubin (1969) presents three major differences between the natural and social sciences. The first is made in terms of discussions of theory. In natural science, focus on theory is based upon empirical evidence. In social science, however, theory is generally discussed by contrasting the characteristics of various models. The second distinction concerns the kinds of activity surrounding theory development. Natural science concentrates its

efforts on investigating and collecting empirical data to develop theory. In social science, theories for which little empirical data are available are accumulated. It is from these theories that additional theories are developed. The third distinction focuses upon the rate of change of theory. In natural science, data-gathering activities have produced scientific revolutions and resultant change in theories. But for lack of empirical data, social science has few theories, has been slow to develop new ones, and has most often produced "frequent reinventions of the same theoretical models" (p. 239).

Heinich (1970) adds further distinctions. He notes that theory in natural science "interprets what seems to be"; in social science, theory is interpreted in terms of "what has happened or what is 'becoming'" (p. 62). A final difference is suggested in Heinich's discussion of the classic distinction between theory and practice. In the "pure" or natural science, concern is for the cause-effect relationship, but in the "applied" or social science, focus is placed upon the means-end relationship.

While these distinctions produce endless criticism about theory development in the social sciences, they also reflect that general agreement exists about the problems regarding development of this theory. Major points of agreement include: generality and lack of definition contained in social scientific theory (i.e., the vagueness of theories themselves); lack of rigor applied to the development and testing of theories; and the inadequacies which

exist in the theories when they are applied to the real world (DiRenzo, 1967b; Nagel, 1961; Reynolds, 1971; Rudner, 1968; and others).

Social Scientific Theory

In defense of the social scientist, various scholars have evaluated the progress made in theory development. Hill (1964) observes that "psychologists are becoming more concerned about both the logical basis of their theories and the ways of improving the formal structure of these theories" (p. 28). Dubin (1969) supports this observation by noting that scholars in disciplines such as economics and psychology currently approach their discussions of theory in language not unlike that of the natural scientists (p. 239). Reynolds (1971) recognizes the growing body of social scientific literature and posits that the alternative to well-developed theory is a reliance on common sense, folk wisdom, and individual trial and error (p. 164).

DiRenzo (1967a) provides a conclusion to these observations by defining a mature science as one which

> has developed a solid and valid foundation for the construction of theory. This well-grounded formation consists of a set of properly defined and logically consistent concepts in terms of which the theories may be formulated (p. ix).

To understand fully the nature of social scientific theory, one must attend to the origins of social scientific knowledge. It is in this attention that the notion of a social science expands to social sciences. Disciplines draw from each other and from

natural science and adapt the information to suit their particular needs. This exchange and adaption process results in the formation of disciplines which overlap, but remain, nevertheless, unique in their functions.

The following review, although drawing from scholars in educational communications and technology speaking directly about the knowledge affecting their field, is representative of the development of individual social science disciplines. Ely (n.d.) states that "the diverse branches of the field have been grafted to the trunk to form a new species . . . . The discipline is emerging even though it may not be fully developed" (pp. 18-19). Finn (1953) explained that theory useful to the field is not necessarily confined to the literature of that specific field (p. 14). Meierhenry (1971) adds that "we will draw the elements initially from a wide range of fields and disciplines but . . . the application of these theories and principles must be applied" (p. 18) by the professionals in the field. Norberg and Silber (1972) comment about the adaption of knowledge. They note that knowledge is useful only when a particular discipline defines a relationship between the knowledge and the functions of that discipline (p. 17).

Rationale for Theory

Stinchcombe (1968) provides a succinct rationale for the existence of social scientific theory and a basic criterion for its evaluation:

> The reason for having theories of social phenomena is to explain the pattern in observations of the world . . . if the concepts in a theory are so vague that it is difficult to find corresponding observations, they are unlikely to be useful in illuminating the pattern in observations. That is, a theory to be useful must be specific enough that it might be disproved (p. 5).

Kinds of Social Scientific Theory

Boring (1963) compiled a hierarchy of the types of psychological and scientific theories as a means for evaluating current efforts in the social sciences in the development of theory. These theories range from the most unsubstantiated to the most rigorous in terms of evidence needed for proof and include: theories with no evidence; theories with rationalized support; theories with insufficient evidence; hypotheses that cannot be tested; hypotheses that can be tested; generalizations as theories; systematic classification as theories; descriptive theories; analytical theories; physiological theories; conceptual theories; physical models; mathematical models; and reification of concepts (pp. 213-222). While the first type, theories with no evidence, represents simply an idea with no supportive evidence to prove it, the last type, reification of concepts, would present the ultimate goal of the development of an idea. It would be an abstract concept supported by sufficient substantiated evidence of proof. The evidence would be such that the abstract concept would be regarded as a material thing.

Evaluation of Theory

Drawing from the work of Gordon (1968), Kaplan (1964), and Lachman (1960), Snow (1973) elaborates on the criteria used to evaluate theory. He explains that "the statement of a theory should make explicit its postulates . . . and the definitions of terms involved in these postulates" (p. 213). Statements should also make explicit the boundaries of their concerns and the limitations under which they are proposed (p. 214). With regard to theories themselves, they should have internal consistency as logical systems; be consistent with existing empirical data; be capable of generating specific hypotheses and predictions; and be testable, parsimonious, and quantifiable (pp. 215-221). Snow cautions that unnecessary symbolizations and formalizations, as well as over-simplification, should be avoided (pp. 221-222).

Snow's (1973) focus on the evaluation of theory in the social and behavioral sciences is toward the usefulness, rather than the truthfulness, of the theories themselves (p. 103). Gibbs (1972) lends further emphasis when he notes that "predictive power should be the primary criterion by which sociological theories are assessed" (p. 64).

Problems in Social Scientific Research

Three major problem areas occur in the conduct of theoretical research in social science. Briefly, they are the restrictions imposed on social science in the conduct of scientific research, the tools used in the conduct of scientific research, and the absence of rules to insure the full development of formal theory.

Nagel (1961) outlines specific problems with which the social scientist must contend in the conduct of research: the limitations in the numbers of forms of controlled inquiry; the aspects of cultural relativity which impose upon the results of scientific investigation because of the culturally determined or historically conditioned elements of differing cultures; the variability of habitual modes of social behavior; the subjective nature of social science subject matter; and the value-oriented bias of social inquiry (pp. 450-494).

With regard to the tools of research, Dubin (1969) says that no dominant analytical tools exist within each of the social scientific disciplines, but rather there is a similar set of tools used by all the disciplines. As a result, there is low productivity of social scientific inquiry (pp. 243-244). In support of Dubin, Reynolds (1971) notes that problems are generated by virtue of the characteristics of social phenomena in general. These problems include: identifying and describing major interrelationships; measurements; the influence of measurement upon phenomena; the difficulty of objectivity; and the social-ethical considerations (p. 165). Reynolds (1971) adds that social scientists in general exhibit a general lack of knowledge "about what scientific knowledge should look like and how it is created" (p. 165). This, he concludes, leads to the ambiguity which is reflected in their theoretical writings (p. 165).

Rudner (1968) attends to the problem surrounding a lack of rules, both syntactical and semantical, which preclude development

of fully formalized theoretical systems. This problem relates directly to the composite nature of social science disciplines. In essence, Rudner explains that the borrowing by one discipline of theoretical knowledge from another discipline frequently creates a presupposition about that knowledge: that syntactical and semantical rules have been developed and have withstood empirical tests in support of that knowledge. In reality, what has happened is that the knowledge does not include these rules; consequently, what is borrowed is frequently "common sense" transferred from one discipline to another (pp. 46-48).

Social Science and Research

Dwyer (1975b) notes that "research is the tool which attempts to translate theory into prescription for the practitioner" (p. 10). As noted in previous discussion, research also represents the tools which support construction and testing of theory. Dubin (1969) summarizes that theoretical research is concerned with the construction of theory while empirical research has as its focus the testing of theory. Dwyer's definition suggests applied research while Dubin's distinctions suggest experimental research.

Various approaches to the conduct of social scientific research are represented in discussions of the development of theory. These approaches link directly to the areas of theory construction, theory testing, and theory application.

Rogers and Shoemaker (1971) describe the relationship between theory and empirical data by using Merton's concept of the

"middle range analysis." In so doing, they note six general rules for the development of theory:

1. All concepts must be expressed as variables.
2. The postulated relationship between two concepts is called a general or theoretical hypothesis.
3. A theoretical hypothesis is tested by means of an empirical hypothesis . . . defined as the postulated relationship between two operational measures of concepts.
4. An empirical hypothesis may be accepted or rejected on the basis of the statistical tests of significance.
5. A theoretical hypothesis is supported or rejected on the basis of the tests of corresponding empirical hypotheses.
6. The relationships between each of the two concepts and other concepts may be analyzed, and, as findings of this nature gradually accumulate, a more general body of theory is developed (pp. 88-90).

Dubin (1969) suggests that because of the developmental nature of the social science disciplines, descriptive research should be encouraged. "Descriptive research is the stuff out of which the mind of man, the theorist, develops the units that compose his theories. The very essence of description is to name the properties of things" (p. 85).

Of research in general, Dubin (1969) suggests an approach termed "interdisciplinary" research, which he describes as "a series of coordinate analytical problems which are simultaneously attacked by scientists from several behavioral disciplines" (p. 244). He notes another approach applicable both to interdisciplinary and descriptive research. Called the "contiguous-problem" approach, the boundaries of two or more theories are defined and each is empirically tested by the appropriate discipline. The theories which result are then compared and combined (pp. 245-248).

In dealing with the limited number of methods which the social scientist can use in controlled inquiry, Nagel (1961) suggests an approach he terms "controlled investigation" or "controlled empirical inquiry." Essentially, this would be a "deliberate search for contrasting occasions" (p. 453) in which a phenomenon occurs consistently or occurs in only some instances. This search is then followed by an examination of certain factors predetermined to determine whether or not "variations in these factors are related to differences in the phenomena" (p. 453). Nagel concludes that the major areas available for controlled empirical inquiry in social science are laboratory experiments, field experiments, and the manipulation of data. Of this last area Nagel notes that "the subjects manipulated in these investigations are recorded (or symbolically represented) data of observation on relevant factors, rather than the factors themselves" (p. 458).

Educational Communications and Technology and Theory

In earlier portions of this chapter, documentation was presented regarding the extent to which the field of educational communications and technology is supported in its knowledge by other disciplines (Ely, n.d.; Finn, 1953, and others). Heinich (1971a) further explains this knowledge when he distinguishes between applied and pure fields of inquiry. He notes that the means-end relationship, as opposed to the cause-effect relationship characterized by pure research, is of primary importance in an

applied field such as educational communications and technology (p. 2). As such, Heinich continues, an applied field may use theoretical components of other disciplines but an "applied field has an existence that may be very independent of the theoretical concerns of contributing disciplines" (pp. 2-3).

Meierhenry (1971) suggests that the application of theories from other disciplines is a task "which must be done if instructional technology is to emerge and develop as . . . [a] unique field" (p. 18). He expands on this idea by saying that the "application of the theories, postulates, principles, etc. must be made by instructional technologists to the solution of conceptual, learning and management problems unique to instructional technology" (p. 1).

Origins of Knowledge

The origins of a field and its principal ideas are represented both in the literature and in the activities of a discipline. Meierhenry (1971) suggests that the roots for the field of educational communications and technology stem from learning theory, perception theory, social theory, iconographic theory, communications theory, information theory, and cybernetic theory. In a presentation before AECT members in 1973, Charles F. Hoban, Jr., noted that theories supporting various concerns impact upon the professional and his/her activities in the field. These concerns include: socialization functions of the schools; learning psychology; communications; media; and technology.

Teague (1972) categorized nine major functions for which professionals in this field must demonstrate competency. A review of these categories suggests additional areas which contribute knowledge to educational communications and technology. The categories are research-theory, design, production, evaluation-selection, support-supply, dissemination, utilization, organizational management, and personnel management (pp. 34-35).

A word of caution about the origins of knowledge for the field is provided by Norberg and Silber (1972): "while the basic information of the field comes from many disciplines, the applications of theories and data within an integrating framework of educational technology . . . must be accomplished by the field itself" (p. 17).

Contributing Areas of Theory

Rudner (1968) introduces the notion of "partial formalization" in the process of theory development. Partial formalization is produced as a result of the lack of a syntax, or calculus. Because so much of the theoretical knowledge used in the field originates in other disciplines, and because of the lack of a syntactical system, Rudner posits that the problem is to "determine just what constitutes a fruitful degree of formalization at any stage of the theory's development" (p. 53). This problem may be the most significant a theorist in the field faces in formalizing a theory. Likewise, it is a problem faced by the social sciences in general.

Scholars in contributing areas of theory clearly support the existence of this problem. This researcher suggests that there are at least four contributing areas of theory which share major influence upon the field: communications, learning psychology, instructional theory, and general systems theory. These areas of theory are discussed below.

Communications Theory.--In the area of communications theory, "argument is still heard over the question of what communication is, and relatively little has yet been accomplished toward answering theoretical questions concerning the nature of the process" (Bettinghaus, 1968, p. 90).

In the presentation of various communications models which provide descriptive information on the communications process, Bettinghaus (1968) notes that the major criterion for evaluating the usefulness of these models is that of "utility" (p. 95). Ball underscores the Bettinghaus contention that the major emphasis in the field of communications is on the notion that communications is a process (p. 6). Or, as Heinich (1970) would add, communications is an applied science in which emphasis is placed upon the means-end relationship.

Learning Theory.--In speaking of learning theory, Logan (1968) suggests that

> 'Theory of learned behavior' is perhaps a more correct expression. It not only connotes that behavior is the object of interest. It also indicates that the data primarily considered by the theorist when building the theory were obtained from relatively simple learning situations (p. 90).

Few would argue the profound influence B. F. Skinner has had on learning psychology. His laboratory experiments and research into stimulus-response behaviors have laid the groundwork for considerable research about the learning process. The effects and results of this influence have frequently been the focal point of further research and resultant criticism. It is interesting to note that while Skinner denies being a theorist (Hill, 1974), others proclaim him the most important learning theorist (C. F. Hoban, 1973).

Scandura (1966) summarizes some of the current problems which induce criticism of behavioral research. He notes that "those who base their instructional technologies on learning theory, either explicitly or implicitly, all make the following assumptions" (p. 140):

1. Principles discovered and found useful in laboratory situations are equally critical in instructional settings. The learning scientist, for the most part, finds it difficult to conceive of the possibility that the principles of reinforcement, contiguity, stimulus generalizations, and mediation are not decisive in the classroom.

2. No learning theorist, particularly one whose work is based largely on animal studies . . . would ever contend that any existing learning theory would be sufficient to provide anything like a close facsimile of teaching and learning in a classroom without the addition of as yet unknown principles and composition laws . . . . In effect, he contends that teaching is, in principle, reducible to the laws of learning.

3. Implementing knowledge acquired about learning will necessarily involve the development of new teaching technologies. It is physically impossible, for example, for the human teacher to provide immediate reinforcement for each student in a class (pp. 140-141).

Logan (1968) underscores Scandura's assumptions by adding:

> It has been taken for granted that the principles of learning determined in the laboratory are relevant to education. It could be argued that theoretical ideas based predominantly on the behavior of nonverbal organisms in simple learning situations will not apply in the complex educational setting . . . . Such reservations might be justified were one to use learning theory to direct educational practice, but so long as the focus is on research, the adequacy of any idea would be determined pragmatically (p. 63).

The 'pragmatic determination' is the problem which Rudner (1968) would explain as the determination of the degree of acceptable partial formalization.

Instructional Theory.--Heinich (1970) provides a distinction between learning theory and instructional theory by using models of these theories for comparison. He notes that learning theory "is the process of making models of laboratory experiments" (p. 71), while instructional theory involves the construction of models for those events which will occur in the future. Heinich adds that "in the absence of theories of instruction, learning theories tend to be sought which put a seal-of-approval on instructional events which have already taken place" (p. 71).

J. D. Hoban (1973) agrees with Heinich: "In the absence of an adequate theoretical base, instructional developers have been forced to root themselves in instructional techniques and procedures" (p. 21). Hoban continues that the operational framework used by developers is "founded on learning theories and instructional guides" (p. 22).

Recognition of the shortcomings of learning theory when applied to instructional problems has been documented by such scholars as Gage (1964), Heinich (1970), Hilgard (1964), and Lumsdaine (1964). Further, the limitations of learning theory to instruction are detailed in the literature by instructional theorists such as Bruner (1964, 1966), Gagné and Briggs (1974), Merrill (1971), and Restle (1964).

The field of educational communications and technology has shown considerable interest in the area of instruction. This interest is reflected in its body of research, its historical roots in the National Education Association, and the creation of organizations such as the Division of Instructional Development of the AECT. The activities generated by these interests are indicative of the concern for formalizing what J. D. Hoban (1973) calls instructional guides.

In an attempt to begin formulating basic theory, Restle (1964) presented a syntactical approach to solving instructional problems. He developed a solution to a practical educational problem by using elementary probability theory, but cautioned that "it should be evident to any experienced teacher that the models discussed . . . are not ready for application in the classroom" (p. 131).

General Systems Theory.--The origins of knowledge in the field of educational communications and technology, coming as they do from so many disciplines, are adapted, yet remain similar to the

knowledge of the contributing disciplines. von Bertalanffy (1968) remarks that while "surveying the evolution of modern science, we encounter a surprising phenomenon--independently of each other, similar problems and conceptions have evolved in widely different fields" (p. 30). This phenomenon induced the development of General Systems Theory, the purpose of which was to "integrate and explain the phenomena and relationships that occur in any system . . . to describe various systems and find relationships among them" (J. D. Hoban, 1973, p. 3).

"The systems approach as applied to education has generally been a useful descriptive and predictive technique for the solution of instructional problems" (J. D. Hoban, 1973, p. 2). The adaptation of General Systems Theory to the systems approach in educational communications and technology is documented by Finn (1960), Hamreus (1972), Heinich (1970), and Hoban (1956, 1973). These scholars have spent considerable time and effort in relating General Systems Theory to the field and its professional activities.

A most obvious result of the influence of General Systems Theory is the development and proliferation of instructional models. Snow (1973) views models as serving to encourage the development of theory especially in research on teaching (p. 81). He notes that

> In the present context, it seems most useful to consider models as well-developed descriptive analogies used to help visualize . . . phenomena that cannot be easily or directly observed. Each model is thus a projection of a possible system of relationships among phenomena (p. 81).

There are no limits to the number of models developed by the field of educational communications and technology and unique to it

(Stamas, 1973). These models are representative of systems thinking and "can be used in seeking to explain some phenomenon by simplification and analogy to already understood events" (Snow, 1973, p. 82).

Problems in Research

In the area of research in the field of educational communications and technology, T. C. Chamberlain (1889) spoke of concerns which transcend the years and apply with equal value today. He poses a question which professionals currently ask of themselves:

> The search for instructional methods has often proceeded on the presumption that there is a definite patent process through which all students might be put . . . hence pedagogical inquiry of the past has very largely concerned itself with the inquiry, 'What is the best method?' rather than with the inquiry, 'What are the special values of different methods, and what are their several advantageous applicabilities in the varied world of instruction?' (p. 6).

While research in the field attempts to deal with the special values of different methods, and to develop formal instructional theories, it meets with stern criticism from Edling (1968):

> Present activity of the instructional technologist is more appropriately described as 'backward science' than as technology. First, an attempt is made to 'particularize,' rather than generalize . . . . Secondly, while most typically scientific inquiry involves the search for explanations of cause-effect relationships, with the hope that such explanations will ultimately have utility, the behavioral technologist looks systematically for causal factors that will produce a given utilitarian effect, with the hope that their relationship may ultimately be explained (pp. 8-9).

The problem of generalizability of research is supported by Allen (1975). While writing specifically about the conduct of research on aptitude-treatment interaction, he speaks to a concern shared by many scholars in the field: "The research results are so fragmentary and diverse that generalizations from these alone are virtually impossible" (p. 139).

To the problem presented above, Allen (1975) adds one other:

> the translation of research and theory into real-life applications is desperately needed. Yet this transfer is so seldom accomplished, either through the inability or hesitation of the researcher or theoretician to interpret findings so that they may be used, or through the reluctance of the practitioner to accept these findings or incorporate them into teaching practices (p. 140).

Dwyer (1975b) comments that variables which need to be considered in translating research into practice include the type of visualization, types of educational objectives, learning characteristics, methods of presentation, and cueing techniques (p. 10).

Over 20 years ago, Finn (1953), while supporting the concentrated emphasis on practice in the field, encouraged the development of theory to allow for ideas which could be tested and researched. He said that without ideas, any field "can go only so far and then has to stop" (p. 173).

While sharing the concerns documented above, Hoban (1968b) includes his own. In discussing the problems faced by the field of educational communications and technology, he focuses upon the gaps which exist between theory and research and between research and

practice. These concerns relate to the following: the strengthening of relationships between psychological theories, research in the field, and educational policy and operations to contribute to educational improvement; the selection of relevant psychological theories to support effective research in the field; total involvement in research conducted in the field by policy-makers and practitioners for effect on the policy-making and operational activities in education; development of a common language between theory-builders, researchers, and practitioners; and training for researchers which includes not only cognate theories and research methodologies, but areas such as the curriculum, institutional structures, and social organization of education (pp. 164-166).

The concerns presented in the literature of the field of educational communications and technology reflect a strong, professional understanding of the complex process of theory construction and the problems attending this process in the social sciences. Concurrently, the scholars authoring this literature recognize the necessity for developing a knowledge base supportive of theory construction. The ideas reflected by the literature are summarized below.

1. The field recognizes its origins as existing in both the natural and social sciences.

2. While the field incorporates into its thinking the knowledge from other disciplines, it recognizes the responsibility for adapting this knowledge for its own purposes.

3. There exists the need for translating the results of research into practical applications.

4. The field has as its focus an applied orientation; that is, a concern with a means-end process.

5. The development of instructional theory is a recognition of a prescriptive approach and a concern with future events.

6. A systems approach to the solution of various operational problems in the teaching-learning process has provided the basis for developing a number of models unique to the field and its activities.

In concluding this final section of Chapter II, Norberg and Silber (1972) provide an appropriate conclusion. They suggest that the success of the profession and the utility of its knowledge will be determined by

> the degree to which practitioners, and especially those who train them or conduct research in the field, are well-versed in the contributing disciplines, are active in the translation of information from the disciplines into useful content for educational technology, are active in the exploration of potential content, and use new content to alter their performance of the functions (p. 32).

Chapter Summary

This chapter has presented basic information on the nature of theory in science, social science, and the field of educational communications and technology. Discussions surrounding the process of theory development have focused generally upon scientific approaches to constructing and evaluating theories. But discussions presented by the social scientists suggest that the inherent nature of social science realizes problems of a unique nature to the conduct of research.

In an effort to continue the search for solutions to the problems surrounding social scientific inquiry and to approach the task of theory construction, using the direction provided by the natural scientists, this study has been proposed. Scientific literature offers concrete direction regarding the methodology of theory construction. Social scientific literature provides substantive suggestions for undertaking the process of theory construction. The design of a study to identify tentative theory is seen as one approach to mediating the differences between the natural and social sciences with regard to constructing theories.

The methodology developed for this study includes a mode for theory identification which has been drawn from Gibbs' (1972) observations on the construction of theories. The methodology adapts the work of Rudner (1968) in his development of syntactical and semantical rules. A process of theory identification, while incorporating scientifically defined direction historically reserved for natural scientific inquiry, is dependent upon the knowledge base in the field of educational communications and technology. As such, it recognizes the profession's applied orientation, i.e., its concern with a means-end process (Heinich, 1970).

Chapter III presents the research design and methodology developed for this study.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Introduction

This chapter is composed of two sections. In the first, descriptions of the population, data collection instrument, data collection procedures, and limitations of the research design and methodology are discussed. The second section presents the data analysis procedures which were developed and employed to identify tentative theories in the field of educational communications and technology.

A discussion in Chapter I noted that this study does not attempt to create or revise any single theory or set of theories, but instead attempts to identify tentative theories that may exist in the field of educational communications and technology. As such, no procedures for testing and validating tentative theories have been developed. It is the nature of theory identification to suggest tentative theories that can then be used as a basis for formal theory construction.

There exists a pattern and similarity between Gibbs' (1972) modes of theory construction and the methodology for theory identification developed for this study. This pattern and the attendant similarities are noted in the following sections of this chapter.

Research Design and Methodology

The present study focuses on the design and development of a five-stage data analysis procedure for determining the existence of tentative theory in the field of educational communications and technology. The original data were collected by using a questionnaire designed specifically for the study.

The Population

The members of the Research and Theory Division, Association for Educational Communications and Technology, were selected to obtain the original data for this study. A list of the division membership was provided by AECT and was current as of September 16, 1975.

The population was further defined as those Research and Theory Division members living in the continental United States. A questionnaire was sent to each of these members.

The Instrument

A two-part questionnaire was developed to collect the original data for this study (Appendix A). Part I solicited demographic data about respondents. Part II was designed to elicit statements which provided conceptual information related to the knowledge of the field. Specifically, respondents were asked to provide statements showing a relationship between two or more concepts. Prior to providing these statements, respondents were asked to list concept terms. This concept term list exercise was included in the questionnaire to assist respondents in organizing their

thoughts and to provide a point of departure in stimulating thinking about relationships between concepts.

The questionnaire was developed as a result of tryout and revision procedures. The tryout population was composed of eight faculty members and two students involved in research, development, teaching, and/or administrative activities. This population was from Michigan State University, The University of Iowa, and Western Michigan University. The faculty population was selected because of its direct association with the field of educational communications and technology. Although all eight of the faculty persons were directly or indirectly involved in research, none were members of the Research and Theory Division. The two students were doctoral candidates in the Instructional Development and Technology professional program at Michigan State University and were selected because of their direct involvement in research and instructional development activities. Likewise, they were not members of the Research and Theory Division.

The tryout/revision procedure was conducted four times. The first prototype was administered to three faculty members. Revisions were made in format and clarity of instructions to respondents. The second tryout was administered to two faculty members and one student. Revisions focused on the format and style of questions in Part I. The third tryout was administered to seven faculty members and one student. Revisions concentrated on the format, style and content of Part II. The fourth and final tryout

was administered to one faculty member and one student with no revisions resulting.

Data Collection Procedures

Questionnaires were initially distributed to the members of the Research and Theory Division with a letter of introduction from Dr. Kent L. Gustafson and Dr. Paul W. F. Witt, faculty research sponsors, and a letter of transmittal from the researcher. Follow-up procedures were initiated three weeks after the initial mailing. The follow-up questionnaire packet included a letter from Dr. Harold Hill, president of the Association for Educational Communications and Technology, a second letter of transmittal from the researcher, and a copy of the questionnaire. (See Appendix B for letters included in the initial and follow-up mailings.)

Each questionnaire was coded by number. The numbers corresponded to an alphabetical listing of the division membership. This numbering system was devised to insure the anonymity of the respondents' answers, but permitted follow-up of non-respondents.

Limitations of the Design and Methodology

The use of a questionnaire placed certain restrictions and limitations upon the researcher. Among these was the necessity of relying completely on the integrity of the respondents in answering and returning the questionnaire and in providing useful responses.

A second limitation centered on the nature of the responses sought in Part II of the questionnaire. While example statements, provided by the researcher, implied the use of complete sentences

and correct grammar, the questionnaire employed open-ended questions to allow maximum flexibility in kind and amount of information provided by the respondents. The concern, then, focused upon the extensive collection of information available to respondents which could be provided in the questionnaire and the researcher's ability to interpret this information. Furthermore, grammatically incorrect sentences and the researcher's inability to interpret systematically certain statements created the need to disregard some potentially valuable information. These problems are fully discussed in the following section.

Data Analysis

To determine the existence of tentative theory, a five-stage data analysis procedure was developed. The first stage consisted of rules and guidelines to identify concept terms (CT) and concept term phrases (CTP) provided by respondents in their statements. The second stage involved categorizing types of statements. In the third stage, concept terms and concept term phrases were combined because of duplication and similarity. The fourth stage consisted of a mechanism to combine statements into analyzable groups according to similarity of purpose and compatibility of meaning. The fifth and final stage involved analysis of groups of statements to determine their worth as tentative theories.

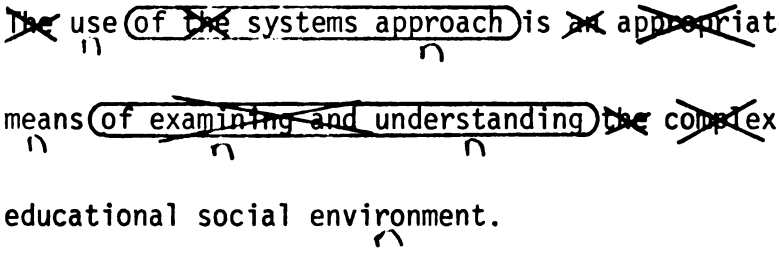
Identification of Concept Terms and Concept Term Phrases

The first stage of data analysis required the design and development of rules and guidelines for identifying concept terms (CT) and concept term phrases (CTP) (see Appendix C for complete instructions). The development of this stage was guided by Gibbs' (1972) modes of formal theory construction in that major parts of a theory were identified.

Concept terms were defined as single word nouns representing concepts. Concepts were defined as names given to events or occurrences (Reynolds, 1971). Examples of concept terms are learning, instruction, and development. Concept term phrases were defined as multiple word phrases which contained a concept term and descriptors and/or modifiers of that concept term, e.g., individualized learning, classroom instruction, and instructional development.

During the identification of concept terms and concept term phrases, emphasis was placed on linguistic and grammatical analysis. A structural approach to grammar was used in that nouns were identified and then descriptors and/or modifiers of those nouns were identified.

EXAMPLE: Given the statement, "The use of the systems approach is an appropriate means of examining and understanding the complex educational social environment," the rules and guidelines for determining CT's and CTP's are applied.



resulting in the following CT's and CTP's: use: approach (systems), means, environment (social), and environment (educational).

Once identified, concept terms and concept term phrases were alphabetized.

Categorization of Statements

In the second stage of analysis, the statements provided in response to the questionnaire were reviewed and categorized as follows: definitions, rules, relationships, descriptions, and unusables.

This stage of data analysis was guided by Gibbs' (1972) modes of formal theory construction in that basic units of a theory were recognized. Further, criteria for distinguishing types of statements and identifying them were designed. Statements were categorized in order to provide a classification system for the data and a management tool for analysis. This process enabled the researcher to eliminate those statements which did not provide usable data for analysis (see Appendix D for complete instructions on the categorization of statements).

The second stage of data analysis required that all respondents' statements be individually reviewed. Each statement was diagrammed, using a subject-verb-complement analysis. Concept terms and concept term phrases in the subject and complement of each statement were determined and diagrammed with the verb. Categorization of statements was completed by analyzing the diagram and, in particular, by defining the relationship of the verb to the CT's

and CTP's in the subject and complement of the statements. Example statements are provided on the following pages and are taken directly from returned questionnaire responses.

Statements which defined or implied definition of concept terms and concept term phrases were called definition statements. This category was further developed by subcategorizing definition statements. These subcategories included equal, congruent/similar, and component.

An equal statement was a direct definition of a concept term or concept term phrase where the subject of the statement was clearly defined by the complement:

EXAMPLE: Category: Definition
Subcategory: Equal

Given the statement "Instructional development is a systems operation which applies systems theory to the development of instruction," CT's and CTP's are identified and lettered and the subject, verb, and complement of the statement are noted:

subject — complement

Instructional development (n) is a systems operation (n) which applies systems theory (n) to the development (n) of instruction. (n)

A development (instructional)
B operation (systems)
C theory (systems): development: instruction

Using the guidelines outlined in Appendix D, the statement is then diagrammed and categorized:

A congruent/similar statement represented the implication of definition or similarity between the CT's or CTP's in the subject and the complement of the statement.

EXAMPLE: Category: Definition
Subcategory: Congruent/Similar

subject
Instructional design implies that man needs to
complement
improve the methods which we design, test, and
evaluate

A design (instructional)
B man
C methods

A component statement defined the CT or CTP as part of, or including, other CT's and/or CTP's.

EXAMPLE: Category: Definition
Subcategory: Component

subject
Program evaluation incorporates all descriptions and
complement
inferential data concerning instruction

A evaluation (program)
B descriptions
C data (inferential)
D instruction

The category of definition statements, including the subcategories equal, congruent/similar, and component, was considered to be a valid category for analysis in determining tentative theories. Statements in this category were used in subsequent stages of analysis.

Statements which implied the occurrence of an event or the development of concepts through demand or suggestion were termed rule statements. This category was further developed by subcategorizing these statements to include goal/objective/task, must, need/ought/should, and could/may/might statements.

A goal/objective/task statement specified the goal, objective, or task of a CT or CTP.

EXAMPLE: Category: Rule
Subcategory: Goal/objective/task

Given the statement "The goal of instruction is to maximize the efficiency with which all students achieve specified objectives," the CT's and CTP's are identified and lettered and the subject, verb, and complement are noted:

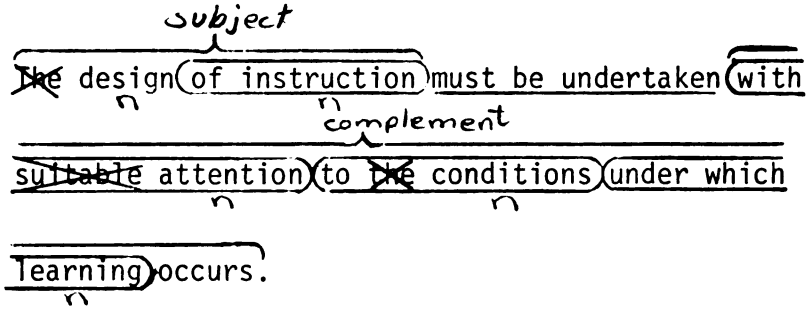
subject
~~The~~ goal (of instruction) is to maximize ~~the~~ efficiency
complement
(with which ~~all~~ students) achieve specified objectives.

A goal: instruction
B efficiency
C students
D objectives (specified)

Using the guidelines outlined in Appendix D, the statement is then diagrammed and categorized:

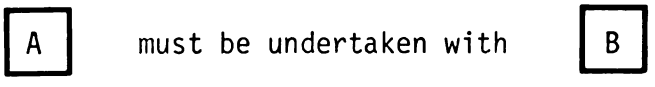
A must statement directed that action be taken upon CT's or CTP's in the subject of the statement and that action was specified in the complement.

EXAMPLE: Category: Rule
Subcategory: Must



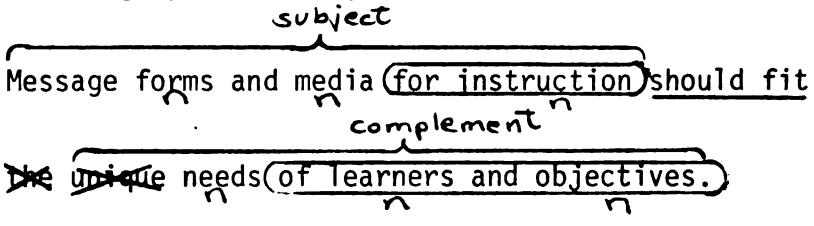
~~The~~ design of instruction must be undertaken with
~~suitable~~ attention to ~~the~~ conditions under which
learning occurs.

A design: instruction
B attention: conditions: learning



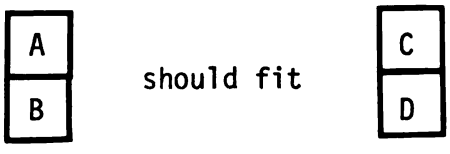
A need/ought/should statement implied or suggested that action should be taken with respect to the CT's or CTP's in the subject of the statement.

EXAMPLE: Category: Rule
Subcategory: need/ought/should



Message forms and media for instruction should fit
~~The~~ ~~unique~~ needs of learners and objectives.

A forms (message): instruction
B media: instruction
C needs: learners
D needs: objectives

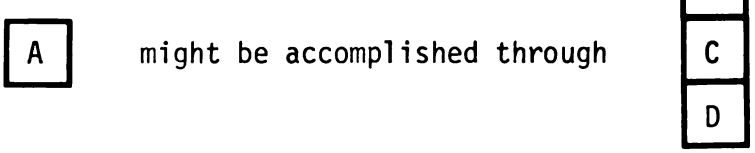


A could/may/might statement suggested certain action in relation to the CT's and CTP's in the subject of the statement.

EXAMPLE: Category: Rule
Subcategory: could/may/might

~~The~~ requirements of individualization of instruction might be better accomplished through more personalized education, modular schedules, and learning packages.

A requirements: individualization: instruction
B education (personalized)
C schedules (modular)
D packages (learning)



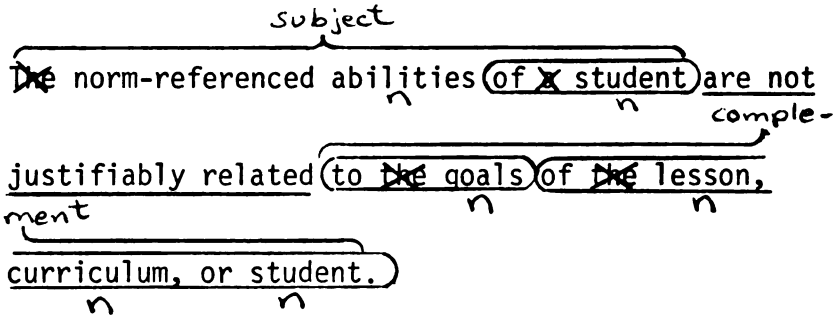
The category of rule statements, including the subcategories goal/objective/task, must, need/ought/should, and could/may/might statements, was considered to be a valid category for analysis of tentative theories. Statements in this category were used in subsequent stages of analysis.

Statements which implied or represented a relationship between two or more CT's and/or CTP's were termed relationship statements. This category was further defined by subcategorizing the statements into strict and loose statements.

A strict statement clearly specified a relationship between two or more CT's and/or CTP's in the subject and the complement of the statement.

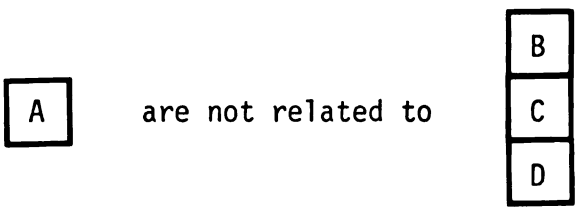
EXAMPLE: Category: Relationship
Subcategory: Strict

Given the statement, "The norm-referenced abilities of a student are not justifiably related to the goals of the lesson, curriculum, or student," CT's and CTP's are identified and lettered and the subject, verb, and complement of the statement are noted:



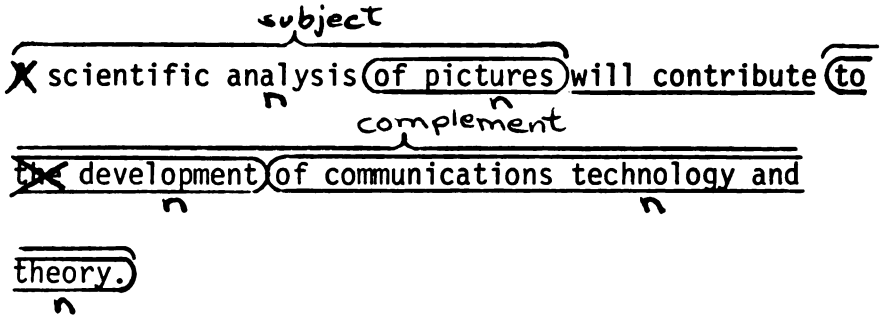
A abilities (norm-referenced): student
B goals: lesson
C goals: curriculum
D goals: student

Using the guidelines outlined in Appendix D, the statement is diagrammed and the category identified:



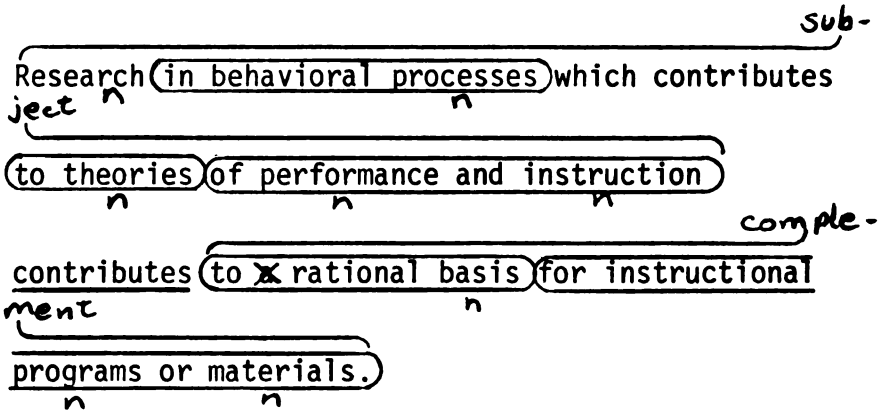
A loose statement implied or suggested a relationship between two or more CT's and/or CTP's in the subject and complement of the statement and was subdivided into present and past/future statements which represented occurrences in time.

EXAMPLE: Category: Relationship
Subcategory: Loose (past/future)



A analysis (scientific): pictures
B development: technology (communications)
C development: theory (communications)

EXAMPLE: Category: Relationship
Subcategory: Loose (present)



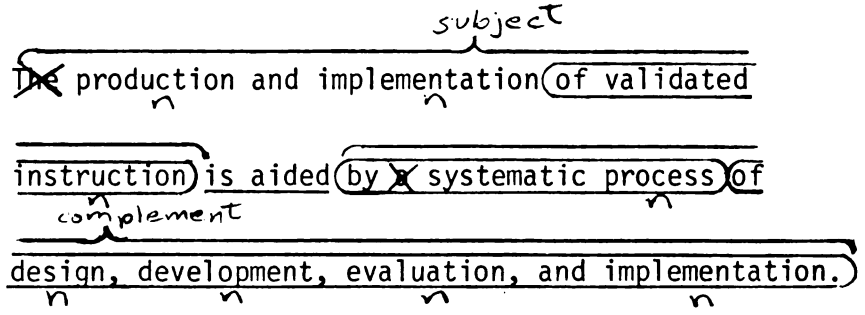
A research: processes (behavioral)
B theories: performance
C theories: instruction
D basis: programs (instructional)
E basis: materials (instructional)

The category of relationship statements, including the subcategories strict and loose, was considered to be a valid category for analysis of tentative theories. Statements in this category were used in subsequent stages of data analysis.

Statements which described characteristics of, or action currently being taken regarding, CT's and/or CTP's were termed description statements. No subcategories were further defined because the category itself adequately described the kind of statement it represented.

EXAMPLE: Category: Description

Given the statement, "The production and implementation of validated instruction is aided by a systematic process of design, development, evaluation, and implementation," the CT's and CTP's are identified and lettered; and the subject, verb, and complement of the statement are noted:



A production: instruction (validated)
B implementation: instruction (validated)
C process (systematic): design
D process (systematic): development
E process (systematic): evaluation
F process (systematic): implementation

Using the guidelines outlined in Appendix D, the statement is then diagrammed and categorized:

The general nature of the category of description statements was considered to be valid for analysis. Statements in this category were used in subsequent stages of analysis.

Statements which did not fall into the above categories were termed unusable statements. This category was defined as a result of subcategorizing statements which represented critique, review, and uncodable statements.

A critique statement clearly represented the personal opinion of the respondent and/or was a critique or criticism of current practice based on opinion.

EXAMPLE: "True individualization of instruction probably cannot be accomplished without the aid of a computer as a data management, storage, and retrieval device."

This statement has been qualified by the respondent, i.e., ". . . probably cannot be accomplished . . ." As such, it is a critique statement representing the respondent's personal opinion and cannot be considered an empirical statement.

A review statement directly referred to the name of an author or title of a literary work.

EXAMPLE: "Krugman (American Journal of Advertising Research, '71) et al. is also bringing new ideas to the understanding of media."

Using the rules and guidelines for identifying CT's and CTP's, proper names, titles, and references are not considered to be CT's and CTP's. As such, this statement is considered a review statement and would ultimately contain only one CTP. Elimination of author, title, or citation in a review statement ultimately led to the subject, complement, or major parts of each, being deleted, thereby precluding the development of a diagram.

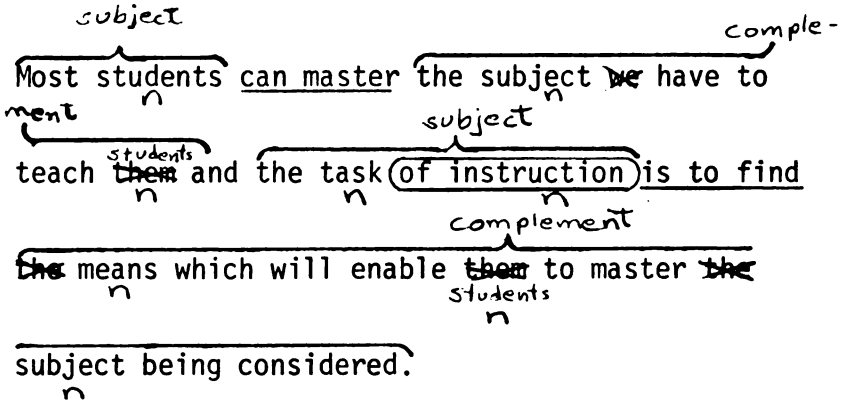
An uncodable statement was one which could not be diagrammed according to the subject-verb-complement structure. This subcategory was further subdivided into compound and unqualified statements.

A compound statement contained more than one subject-verb-complement component.

EXAMPLE: Category: Compound

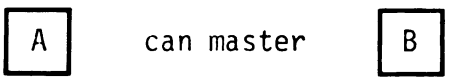
"Most students can master the subject we have to teach them, and the task of instruction is to find the means which will enable them to master the subject being considered."

This statement contains two discrete subjects, verbs, and complements and is termed a compound statement. Diagramming this statement was impossible under the rules and guidelines developed because two categories were represented in the statement, i.e., description and rule (subcategory goal/objective/task).



A students
B subject

CT's and CTP's contained in a complete sentence which can be diagrammed as a description statement:



C students
D task: instruction
E means
F students
G subject

CT's and CTP's contained in a complete sentence which can be diagrammed as a rule, subcategory goal/objective/task:

Statements identified as compound statements were few in number. It was the judgment of the researcher, based on the small number of statements, that more of this type were needed to determine guidelines for diagramming. As such, the few statements did not warrant the time nor provide sufficient information to be further analyzed.

An unqualified statement was one which was not a functional sentence and/or did not contain at least two CT's or CTP's.

EXAMPLE: "Greater openness of school environments and the students encouraged to use community facilities, government services for learning including industries."

While this statement contains a sufficient number of CT's and CTP's, i.e., openness: environments (school), student, etc., it is not a functional sentence. Diagramming is impossible because the subject, verb, and complement cannot be clearly identified. As such, the statement cannot be further analyzed and is termed an unqualified statement.

EXAMPLE: Category: Uncodable

"The research technology must be greatly expanded."

This statement contains only one CTP, i.e., technology (research), and does not provide sufficient data to be diagrammed. As such, it cannot be analyzed further and is termed an unqualified statement.

The category of unusable statements, including the subcategories critique, review, and uncodable, was not considered to be valid for use in identifying tentative theories. These statements were not valid because they represented personal opinion, made reference to specific authors and/or titles, were grammatically incorrect, did not contain two or more concept terms and/or concept term phrases, or were compound statements.

Concept terms and/or concept term phrases occurring in the unusable category of statements were deleted from the alphabetical list of CT's and CTP's if, and only if, they had not occurred in the usable statements, definition, rule, relationship, or description.

Combining Concept Terms and Concept Term Phrases

The third stage of data analysis was designed to synthesize the concept terms and concept term phrases developed in the first stage of analysis (see Appendix E for specific instructions) and create a Frequency of Use List to support the fourth stage of analysis. Concept terms and concept term phrases were synthesized using the following criteria:

1. Exact duplications.

   EXAMPLE: Behavior was identified five times and combined into one CT behavior (4), indicating that the CT had been duplicated four times.

2. CT's and/or CTP's differentiated only by singularity and plurality.

   EXAMPLE: Learner and learners were reviewed first for duplications, resulting in learner (6) and learners (1). Combining the singular and plural forms was accomplished with the use of parentheses, i.e., learner(s) (7), indicating that the singular and plural forms of the CT had been combined. The number in parentheses then represented the total number of times the singular and/or plural forms had been duplicated.

3. CTP's containing the same CT and adjectives, descriptors, or modifiers.

   EXAMPLE: Evaluation (program) (1), which had been duplicated once, and evaluation: programs were combined to form evaluation - program(s) (1). This form of the CTP indicated that three original CTP's had been combined and either form had been duplicated once and contained a plural adjective, descriptor, or modifier.

4. CT's and CTP's denoting the same or similar meanings were combined and called CT combinations and CTP combinations.

   EXAMPLE: Ability(s) (2), a combination of the original forms ability and abilities (2) combining two duplications, and capability were combined to form ability(s) (2)/capability.

5. CT's and CTP's representing general areas of similarity were combined and called CT/CTP combinations.

   EXAMPLE: Instructor (1), manager: learning, teacher (3), and teacher (human) (1) were combined to form instructor (1)/manager: learning/teacher (3)/teacher (human (1). This form indicated the combination of CT's and CTP's where two CT's had been duplicated four times and one CTP had been duplicated once.

Concept terms and concept term phrases which did not meet the above criteria were left in their original state, as developed in the first stage of analysis.

After combining concept terms and concept term phrases, a new alphabetical list of terms was generated. This list included the combinations resulting from the application of the above criteria, and all CT's and CTP's which were not combined.

Combinations and all CT's and CTP's appearing on the new alphabetical list were then reduced to primary nouns. This reduction process provided the base from which the Frequency of Use List was developed, and resulted in the following outcomes:

1. Concept terms which were not combined were left in their original state.

   EXAMPLE: Accountability was not combined with any other CT or CTP. No further reduction was necessary.

2. Concept terms which were combined and remained single word nouns required no further reduction.

   EXAMPLE: Behavior(s) (4) was combined as a result of duplication and singular and plural forms. No further reduction was necessary.

3. Concept terms which were combined and resulted in the combination of two or more nouns required no further reduction.

   EXAMPLE: Motion/movement resulted from the combination of two CT's, motion and movement because of same or similar meaning. No further reduction was necessary.

4. Concept term phrases which were not combined were reduced to the noun only and were called reduced phrases.

   EXAMPLE: Analysis (needs), a CTP not affected by the combination process, was reduced to analysis.

5. Concept term phrases which were combined and contained either one or more nouns with adjectives, descriptors, or modifiers were reduced. Reduction of these combinations resulted in the deletion of the adjectives, descriptors, or modifiers. The remaining noun or nouns were called a reduced phrase.

   EXAMPLES: Theory(s) - learning (2), affected by the criteria for duplication, singular and plural combinations, and combining same or similar CTP's, was reduced to theory(s) - (2).

   Method/mode(s): instruction, affected first by the criterion for combining singular and plural forms and then combined for same or similar meaning, was reduced to method/mode(s).

After the reduction process was completed, the alphabetical list was again revised and contained the following:

1. Original concept terms which were not combined with other concept terms or concept term phrases.
2. Concept terms which had been combined with other concept terms.
3. Concept terms which had been combined with other concept term phrases and reduced.
4. Original concept term phrases which had not been combined, but had been reduced.
5. Concept term phrases which had been combined with concept terms or other concept term phrases and had been reduced.

A review of the resultant concept terms and reduced phrases was made to formulate the Frequency of Use List. All concept terms and reduced phrases which appeared on the alphabetical list were included on the Frequency of Use List. The four-time appearance was determined to be the minimal number necessary to support the fourth stage of analysis.

The resulting concept terms, which represented a four-or-more-times appearance and appeared on the alphabetical list, were called primary concept terms (PCT). PCT's were included on the Frequency of Use List. Those reduced phrases which represented a four-or-more-times appearance and appeared on the alphabetical list were called primary reduced phrases (PRP). PRP's were also included on the Frequency of Use List.

To determine the four-time appearance of concept terms and concept term phrases, two procedures were used. The first provided for a visual count of multiple appearances of the same primary nouns. The second provided for the interpretation of the coding system developed during the combination process and representing original appearances from the first stage of analysis.

Determining primary reduced phrases resulting from CT/CTP combinations included review of reduced phrases resulting from CTP's and CT's. Determining primary reduced phrases resulting from CTP's included review of CT's. Determining primary concept terms focused only on those concept terms not included in the determination of primary reduced phrases.

To determine the total number of visual appearances of concept terms and reduced phrases, all reduced phrases resulting from CT/CTP combinations were counted first. Each noun in the reduced phrases counted as one (1), e.g., motion/movement was equal to a count of two (2). The appearance of these nouns among reduced phrases resulting from CTP's was identified, and each appearance was counted as one (1) and added to the first count (i.e., two

resulting from motion/movement). The count was continued among the concept terms and added to the cumulative total.

EXAMPLE: motion/movement, a reduced phrase resulting from a CT/CTP combination, was equal to two (2) because it contained two primary nouns. Motions, a reduced phrase resulting from a CTP, was identified, equal to one (1), and added to the original count of two (2). No concept terms motion or movement were identified. The total count for this reduced phrase was three (3) meaning that motion and movement were identified three (3) times within statements.

After all reduced phrases resulting from CT/CTP combinations, CTP's, and CT's were counted, all reduced phrases resulting from CTP's and remaining after the first count were reviewed. Each appearance as a reduced phrase was equal to one (1). Concept terms, which were identical primary nouns, were identified and each appearance added to the total.

EXAMPLE: model(s), a reduced phrase resulting from CTP's models(communications), models (engineering), models (evaluation), and model (systems), was identified and counted four (4) times. It was not identified among the concept terms and resulted with a final count of four (4).

After all reduced phrases were counted, all concept terms remaining from the first two counts were reviewed for a four-time appearance.

The coding system developed during the combination of CT's and CTP's was used to determine the total number of equivalent appearances of concept terms and reduced phrases. The codes were totalled and added to the number of visual appearances of the

primary nouns representing reduced phrases and concept terms. The codes represented original appearances resulting from the first stage of analysis and were valued as follows:

1. All numbers contained in parentheses were added to the total number of visual appearances of the reduced phrase and/or concept term.

   EXAMPLE: base (2) was counted as three (3) where base = 1
   (2) = 2
   total = 3

2. The occurrence of "(s)" was equal to one (1) appearance.

   EXAMPLE: communicator(s) was counted as two (2) where
   communicator = 1
   (s) = 1
   total = 2

3. The occurrence of a hyphen (-) was equal to one (1) appearance.

   EXAMPLE: management - was counted as two (2) where
   management = 1
   - = 1
   total = 2

   The difference between this total and the one in #2 above is that in #2, the total represented the combination of the singular and plural forms of the CT; the total in #3 represented the combination of two CTP's in which the adjective, descriptor or modifier was the same, i.e., management (learning) and management: learning.

4. A virgule (/) following a primary noun and not proceeded by another noun was equal to one (1) appearance.

   EXAMPLE: event/ was counted as two (2) where event = 1
   / = 1
   total = 2

5. Concept terms and reduced phrases containing more than one code counted each code separately as detailed above and added the equivalent appearances to the total of visual appearances.

EXAMPLE: technology(s) (2) was counted as four (4) where

technology	= 1
(s)	= 1
(2)	= 2
total	= 4

EXAMPLE: theory(s) - (2) was counted as five (5) where

theory	= 1
(s)	= 1
-	= 1
(2)	= 2
total	= 5

6. Two virgules (//) following a primary noun and preceding a second primary noun are equal to one appearance, the first virgule representing two CTP's with similar adjectives, descriptors, or modifiers, the second virgule separating the two primary nouns.

EXAMPLE: experience(s)//situation (2) was counted as six (6) where

experience/situation	= 2
(s)	= 1
(2)	= 2
/	= 1
total	= 6

This code (//) would have appeared as the result of combining three or more CTP's containing the same adjectives, descriptors, or modifiers, i.e., this example represented the combination and reduction of experience(s) (learning), experience (educational), and situation (learning) (2).

Determination of the four-or-more-times appearance of concept terms and reduced phrases produced the Frequency of Use List containing primary concept terms and primary reduced phrases. The Frequency of Use List then supported the fourth stage of analysis.

Combining Statements

The fourth stage of analysis required combining statements into groups to be reviewed for their value as tentative theories (see Appendix F for Guidelines for Combining Statements).

The Frequency of Use List provided the initial data used in combining statements and a five-step procedure was developed. First, a primary concept term (PCT) or primary reduced phrase (PRP) on the Frequency of Use List was selected for review. Selection was based on the following general criteria:

1. All PRP's having 20 or more appearances within statements. This criterion insured that those concept terms and concept term phrases which received the most attention within statements would be reviewed.

2. PRP's which reflected major interest areas within the field of educational communications and technology as represented in the names of the professional association and its divisions. This criterion provided that PRP's not reviewed under the first criterion but reflective of the major interests within the field would be reviewed.

   EXAMPLES: Communications and technology were selected because of the occurrence within the name, Association for Educational Communications and Technology.

   Research and theory were selected because of the occurrence within the name, Research and Theory Division.

3. PRP's which reflected major interests within the field in terms of general focus.

   EXAMPLES: instruction, material(s), and learner(s)/student(s).

The first criterion was determined essential, as it represented the major concepts of importance reflected by the number of times they had been identified within the respondents' statements. The second criterion was developed to reflect the profession's definition of its own areas of focus and concentration. The third criterion was developed to represent major concepts, not identified by the second criterion, which were revealed during the review of

the literature and which applied to the profession as a field within education.

From the second criterion, the following concepts were identified:

1. Communications and technology, from Association for Educational Communications and Technology.
2. Media and management, from Division of Educational Media Management
3. Training and education, from Industrial Training and Education Division.
4. Information and systems, from Division of Information Systems.
5. Development, from Division of Instructional Development.
6. Media, design, and production, from Division of Media Design and Production.
7. Research and theory, from Research and Theory Division.

After PCT's and PRP's were selected from the Frequency of Use List, the second step in the five-step procedure was initiated. All statements containing selected PCT's and PRP's were identified. These statements included the definition, rule, relationship, and description statements. The third step was to identify the concept terms and concept term phrases contained in each statement containing a PCT or PRP. The fourth step involved developing a diagram for each selected PCT and PRP and the concept terms and concept term phrases identified in statements containing them. Cluster areas were developed by identifying concept terms and concept term phrases contained in statements which also contained

the PCT or PRP. CT's and CTP's were grouped into clusters according to similarity of meaning and areas of general concern (see Figure 2 below).

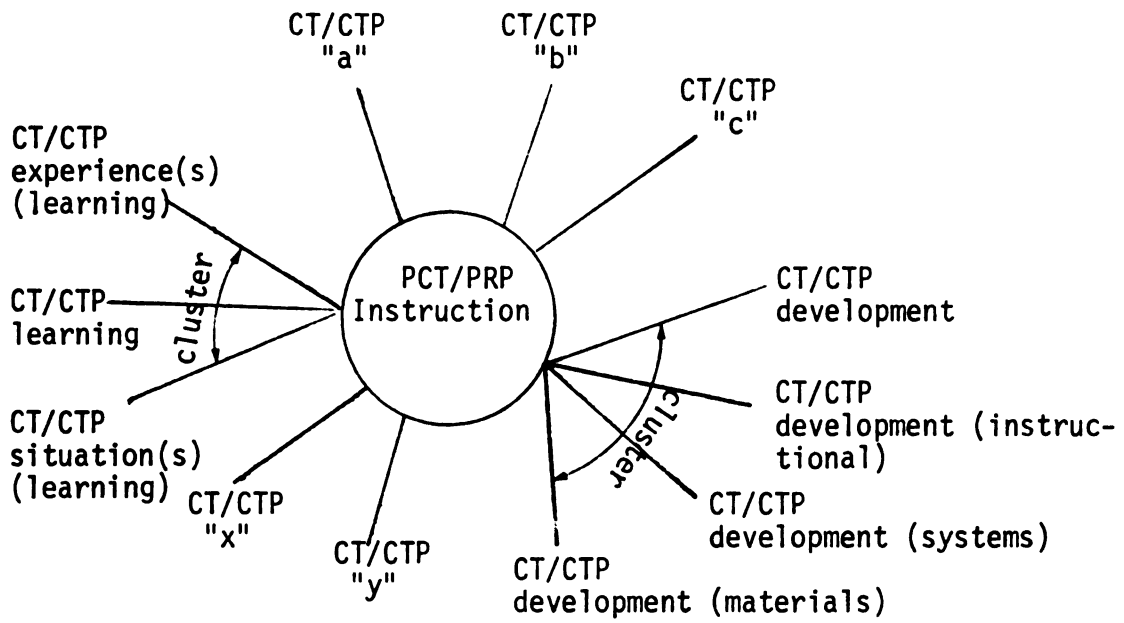


Figure 2: Diagram of a PCT/PRP and Example Clusters.

Figure 2 represents an example of the possible cluster areas resulting from the PCT/PRP instruction and its corresponding concept terms and concept term phrases. CT's and CTP's labelled "a", "b", "c", "x", and "y" represent concept terms and concept term phrases which do not appear to immediately cluster logically

with CT's and CTP's in the cluster areas developed or suggest among themselves a separate cluster area.

EXAMPLE: x = leadership (participatory) and y = period: time. Neither CTP holds an apparent relationship with the cluster areas developed in Figure 2.

EXAMPLE: a = ability(s) (television), b = learning (non-visual), and c = modernization: theory. These CTP's do not readily suggest a potential relationship among themselves. As such, they would not form a cluster area as shown in Figure 2.

The clustering activity, while most readily developed by using single word similarity of concept terms and nouns or descriptors and modifiers within concept term phrases as shown in Figure 2, also allowed for heretofore unrelated CT's and CTP's to be clustered for review. For example, until this point in analysis, CT's and CTP's such as education, experience(s) (learning), and (learning) were not related because prior treatment of CT's and CTP's had focused upon grammatical structure. The development of clusters added the dimension of combining concepts around conceptual similarity and their potential for forming relationships with each other.

The fifth and final step in this stage of analysis involved combining statements. Statements combined into groups of statements provided the base from which an attempt was made to identify tentative theories.

The cluster areas developed around the PCT's and PRP's provided the basis for combining statements into groups. Each concept term and/or concept term phrase contained in a cluster area

provided the means by which a statement could be identified and placed in a statement group. As such, all statements containing the same PCT/PRP and the CT's and CTP's within one cluster were combined into a group of statements representative of the PCT/PRP and the CT's and CTP's within one cluster area.

From Figure 2, for example, the PCT/PRP is instruction. One cluster area presents the CT learning and the CTP's experience(s) (learning) and situation(s) (learning). To identify and combine statements into a group, all statements were reviewed. These included definition, rule, relationship, and description statements. All statements which contained the PCT/PRP instruction and the CT learning were included in the group; all statements containing the PCT/PRP instruction and the CTP experience(s) (learning) were included in the same group; and all statements containing the PCT/PRP instruction and the CTP situation(s) (learning) were included in the group of statements. Each group of statements combined in this manner provided the data analyzed during the fifth and final stage of analysis.

Identification of Tentative Theories

The final stage of analysis contained two phases. The first phase concentrated on the primary concept terms and primary reduced phrases as they existed within the statements in which they were identified. The purpose of this phase was to determine the existence of trends among PCT's and PRP's in relation to categories of statements and their structural placement within these

statements. The second phase of analysis reviewed the individual groups of statements developed from the cluster areas to determine their value as tentative theories.

In the first phase, the primary concept terms and primary reduced phrases contained in the statements were analyzed to determine the category of statement in which they occurred and the position or placement of each PCT and PRP within each statement. This procedure was followed for the statements containing a PCT or PRP and for each PCT and PRP selected for review.

EXAMPLE:

Statement.	Concept formation is the process through which we develop learning styles
PCT/PRP.	process
Category of Statement.	definition
Subcategory of Statement.	equal
PCT/PRP Position.	complement of sentence

The data generated as a result of this procedure was then used to determine the existence of any trends occurring between and among PCT's and PRP's. Factors contributing to trends would include: (1) consistent occurrence of PCT's and PRP's within a particular category of statement, (2) consistent occurrence of PCT's and PRP's within the subjects or complements of sentences, and (3) relationships between the category of statement and the sentence position for individual and/or various PCT's and PRP's.

The final phase of the fifth stage of analysis reviewed the groups of statements for their value as tentative theories. Bern (1968) suggests a list of criteria to use in the evaluation of theory. The criteria are drawn from research conducted in the areas of educational media, learning psychology, communications, and social psychology and is compatible with many of the distinguished authors reviewed in Chapter II of this study.

Bern's list of criteria was applied to the groups of statements and provided the means by which tentative theories were identified. The criteria used were:

1. Explanation. Does the group of statements provide an explanation of what the events of which they speak are, as well as how they occur?

2. Prediction. Does the group of statements make predictions of future events, or can it be used as evidence to make predictions for the future occurrence of events?

3. Clarification. Does the group of statements clarify the purpose of the events, the manner in which the events occur, or, as Dubin (1969) suggests, refine the definition of the events themselves?

4. Summarization. Does the group of statements adequately provide a summary of the purpose, the manner of occurrence, or the meaning of the events themselves?

5. Mediation. Does the group of statements provide sufficient information to allow for adapting our present knowledge of the events to new situations?

6. Experimentation. Does the group of statements provide support for present and future research of the event? Does it suggest direction for future research of the event?

7. Organization. Does the group of statements suggest a structure for the event? Is a taxonomy or model implied?

8. Exploration. Does the group of statements suggest discovery of new events or the manner in which they occur?

9. Mensuration. Does the group of statements allow for an event to be quantified? Is a method of quantification suggested?

10. Commonality. Does the group of statements suggest characteristics common to the events, or the manner in which the events occur, in the statement group or to other groups of statements?

11. Interdisciplinarity. Does the group of statements suggest events, or the manner in which the events occur, with sufficient value to disciplines contributing to the field of educational communications and technology to warrant inspection by those disciplines?

12. Contemporaneity. Does the group of statements apply to present, as well as future, events? Does it transcend time?

These criteria served as the basis from which to evaluate the groups of statements as tentative theories. The questions raised with regard to each criterion above were used to determine the potential of each group of statements as a tentative theory.

Chapter Summary

Chapter III has presented distinctions between theory construction and theory identification, noting their similarities and differences. The research design and methodology were discussed with special attention to the population, data collection instrument, data collection procedures, and limitations of the study. The final section of this chapter presented a five-stage data analysis procedure. The five stages were developed to support identification of concept terms and concept term phrases, categorization of

statements, combining concept terms and concept term phrases, combining statements, and identification of tentative theories.

The findings of this study are presented in Chapter IV.

CHAPTER IV

RESULTS OF THE RESEARCH

Introduction

There are two crucial distinctions between theory construction and theory identification, as reflected in this study. The first distinction was noted in Chapter I and was explained as the development of tests for investigating theory and the interpretation of these tests (Gibbs, 1972). As previously discussed, theory identification does not attempt to construct tests for the tentative theories identified, but rather suggests areas in which theory may exist or be developed. Further, theory identification offers an approach to the organization of knowledge extant in a developing field such as educational communications and technology.

Theory development, as suggested by Rudner (1968), first establishes syntactical rules, or a calculus, and then produces semantical rules for the interpretation of meaning. This study can be related to Rudner's approach to theory construction using a reverse perspective. This suggests that semantical rules are first established which, when applied to respondents' statements, produce meanings. Then, syntactical rules, or a calculus, are developed to identify tentative theory, i.e., the five-stage analysis of questionnaire data. There are a number of considerations implied in this suggested perspective.

A primary consideration attends to the literature of the social sciences. While this literature has provided a language used by many social scientists, it does not necessarily imply that contextual meaning is used uniformly. However, even though the language of the literature is frequently imprecise, it is, nevertheless, appropriate within specifically defined contexts. The task becomes one of standardizing meaning. For purposes of this study, a modified syntactical approach was developed to standardize the many semantical rules.

A second consideration supports this perspective and focuses on the variety of models developed in the social sciences. Perhaps in lieu of a calculus, a rather sophisticated group of models has been developed to explain phenomenon and phenomenon within systems (see Bettinghaus, (1968) et al. in communications; Gagné (1972) et al. in psychology; Hamreus (1972) et al. in educational communications and technology, etc.). The development of models may be, in fact, the social scientific answer to scientific theory. Snow (1973), at least, would allow that it is a step in the right direction toward theory construction.

Finally, the modified syntactical approach developed for this study employed rules of grammar to provide structure to the respondents' statements and to the interpreting of those statements. Whereas respondents were requested to provide substantive information, analysis of those responses was based on the development of an interpretive system which was an extension of original rules of

grammatical structure. The study, therefore, applied syntactical rules to data for which semantical rules had already been developed.

This chapter presents the results of the research conducted to identify tentative theories and is divided into two major sections. Part I presents a report of the raw data obtained from the questionnaires. Part II discussed the results of the five-stage data analysis described in Chapter III.

Results of the Research: Part I

A description of the population, respondent characteristics, and respondent statements provided in the questionnaire are included in this presentation.

The Population

As of September 16, 1975, there were 208 persons listed on the membership roster for the Research and Theory Division of the Association for Educational Communications and Technology. Of this total, the 180 persons living within the continental United States were considered the population for this study. Questionnaires were distributed to this population. Two persons replied by letter that they were no longer members of either the division or the association, resulting in a final population of 178.

Characteristics of Respondents

A total of 63 persons, or 35.4% of the population, returned questionnaires. Of the 63 questionnaires returned by respondents, three were eliminated because of incompleteness and three were not

used due to the lateness of return; thus, 57 questionnaires were used in subsequent analyses of data.

While all 57 respondents were members of the AECT Research and Theory Division, analysis of AECT division affiliation showed that 34 of these 57 respondents also belonged to other divisions. Of these 34 respondents belonging to more than one AECT division, 32 were members of at least the Division of Instructional Development. Nine divisions are represented in the AECT organization, including the Research and Theory Division. Respondents' membership was represented in all nine of these divisions. Tables 1 and 2 in Appendix G detail division affiliation by number of division memberships and division name.

Respondents' educational levels, areas of professional responsibility, employing agencies, years of employment in the field of educational communications and technology, age, and sex are summarized in Tables 3 through 8 in Appendix G.

Of the total number of respondents, 31, or 54.4%, reported that their academic degrees were in the area of educational communications and technology. (See Appendix H for a detailed list of respondents' areas of academic training.) Twenty-one respondents, or 36.8% of the total, held administrative positions and/or academic rank with specific reference to the area of educational communications and technology. (See Appendix I for a detailed list of administrative titles and academic ranks as reported by the respondents.)

As a result of the analyses of demographic data reported by the respondents, over one-half of these respondents can be characterized by the following:

1. Membership in the Research and Theory Division and the Division of Instructional Development;
2. Completion of the doctoral degree;
3. Graduate degree in the area of educational communications and technology;
4. Teaching as a primary professional responsibility;
5. Employment within institutions of higher education;
6. Employment in the field of educational communications and technology from one to ten years;
7. Ranging in age from 31 to 50 years;
8. Male sex.

Questionnaire Statements

Part B of the questionnaire requested that respondents first list concept terms of major importance to the field of educational communications and technology; and then, using these concept terms, provide statements showing relationships between them.

For purposes of generating the statements, the concept term listing exercise was requested to initiate respondent thinking about the field and the relationships which exist among concepts. (The term "concept term," as used in the questionnaire, was defined as the naming of a phenomenon or event and was redefined during the five-stage analysis of data to represent a structural approach to this analysis.) Because of the rationale for listing concept terms, the lists were not incorporated into the five-stage analysis of data.

The emphasis throughout the five-stage analysis was focused entirely on the statements and on the concept terms (as structurally redefined) and concept term phrases contained in the statements.

Statements provided by respondents in the questionnaire were coded by respondent number and statement number. Those statements containing two or more sentences were coded accordingly.

EXAMPLE: Respondent #133 provided the following two statements:

Statement #1

In order to comprehend the effectiveness of instruction and learning, a mastery of learning theory is required.
Code: 133-1 (only one sentence is provided in this statement)

Statement #2

Meaningful learning is a concept congruent with the field. It (meaningful learning) assumes the learner positively identifies with the mode of instruction.
Code: 133-2-A and 133-2-B (each sentence is coded individually)

All sentences contained within statements were coded individually. Of the 297 statements provided by the 57 respondents, 25 contained more than one sentence, increasing the total number of sentences to 356. Tables 9 and 10 below detail the number of statements and sentences provided by the respondents in Part B of the questionnaire.

Once all sentences contained within statements were coded, they were termed "statements" for the remainder of the study and were submitted individually to the five-stage analysis of data. Part II of this chapter presents the results of that analysis.

Table 9: Number of Statements Provided by Respondents

Statements	Respondents	Sub-Total of Statements	Statements with Multiple Sentences
1	7	7	0
2	7	14	3
3	6	18	2
4	7	28	1
5	0	0	0
6	9	54	6
7	5	35	3
8	12	96	7
9	2	18	2
10	1	10	1
17	1	17	0
TOTAL	57	297	25*
MEAN:	5.4 statements per respondent		
RANGE:	1 to 17 statements per respondent		

*The 25 statements contained a total of 59 sentences.

Table 10: Number of Sentences Provided by Respondents

Sentences	Respondents	Sub-Total of Sentences
1	7	7
2	6	12
3	6	18
4	8	32
5	2	10
6	2	12
7	4	28
8	7	56
9	5	45
10	5	50
13	1	13
15	1	15
16	1	16
20	1	20
22	1	22
TOTAL	57	356
MEAN:	6.2 sentences/respondent	
RANGE:	1 to 22 sentences/respondent	

Results of the Research: Part II

This section presents the research findings resulting from the use of the five-stage analysis procedures described in Chapter III. In the first stage of analysis, concept terms and concept term phrases were identified. The second stage categorized the statements received from respondents. Concept terms and concept term phrases which were duplicates and which had similar meaning were combined in the third stage. In the fourth stage, statements were combined into groups as a result of the development of cluster areas of concept terms and concept term phrases. The fifth and final stage of analysis concentrated on identifying tentative theories contained within the groups of statements.

Identification of Concept Terms and Concept Term Phrases

In the first stage of analysis, concept terms (CT's) were redefined from those used in the questionnaire to reflect the structural approach used in the first stage. As such, CT's were defined as single word nouns representing concepts. Concept term phrases (CTP's) were then defined to be multiple word phrases containing a concept term and adjectives, descriptors, and/or modifiers of that concept term.

The identification of concept terms and concept term phrases emphasized the noun and the determination of those adjectives, descriptors, and/or modifiers of the noun (see Appendix C for the rules and guidelines for identifying concept terms and concept term phrases).

The process of identification was followed for each of the 356 statements provided by respondents. Table 11 details the results of this process.

Table 11: CT's and CTP's Identified in First Stage of Analysis

CT's and CTP's Per Statement	Statements	Sub-Total of CT's and CTP's
1	14	14
2	64	128
3	92	276
4	67	268
5	42	210
6	22	132
7	20	140
8	15	120
9	7	63
10	4	40
11	5	55
12	3	36
13	0	0
14	0	0
15	0	0
16	1	16
TOTAL	356	1498*

MEAN: 4.2 CT's and CTP's/statement

RANGE: 1 to 16 CT's and CTP's/statement

*Of the total, 414 were CT's and 1084 were CTP's.

After all concept terms and concept term phrases were identified, they were listed alphabetically.

Categorization of Statements

The second stage of analysis focused on the statements received from respondents. Statements containing more than one sentence were coded and each sentence was treated individually and redefined as a statement throughout the remainder of the study.

Five categories of statements were identified, using rules and guidelines developed for this purpose (see Appendix D for these rules and guidelines).

The first statement category identified was definition. Statements in this category defined, or implied definition of, concept terms or concept term phrases identified in the first stage of analysis. Three subcategories were further developed and named equal, congruent/similar, and component statements. Equal statements directly defined a concept term or concept term phrase. The CT/CTP was named in the subject and defined in the complement of the statement. Congruent/similar statements implied definition or similarity between CT's and CTP's in the subject and complement of the statement. Component statements defined a CT/CTP as part of, or including, other CT's and CTP's.

Forty-two or 74% of the 57 respondents provided 110 definition statements containing 506 CT's and CTP's. Table 12 details the results of this process.

Definition statements constituted 31% or 110 of the 356 statements provided by respondents. This statement category contained 36% or 148 of the 414 CT's, 33% or 358 of the 1084 CTP's, and 34% or 506 of the 1498 CT's and CTP's.

Table 12: CT's and CTP's Contained in Definition Statements

Category	State-ments	CT's Contained in Statements	CTP's Contained in Statements	Respondents
Definition				
Equal	65	75	199	(37)
Congruent/Similar	10	13	33	(7)
Component	35	60	126	(22)
TOTAL	110	148	358	(42)*

*Respondents provided an average of 2.6 definition statements each with a range of from one to eight statements per respondent.

The second statement category identified in this stage of analysis was rule. Statements in this category implied the occurrence of an event or phenomenon or the development of a concept term or concept term phrase. Four subcategories were established and named goal/objective/task, must, need/ought/should, and could/may/might. Goal/objective/task statements directly specified the goal, objective, or task of a given CT or CTP. Must statements directed that action be taken upon CT's or CTP's in the subject of the statement. That action was specified in the complement of the statement. Need/ought/should statements recommended that certain action be taken with regard to the CT's and CTP's contained in the statements. Could/may/might statements suggested that certain action be taken in relationship to CT's and CTP's.

Thirty-one or 55% of the 57 respondents provided 60 rule statements containing 250 CT's and CTP's. Table 13 details the results of this analysis.

Table 13: CT's and CTP's Contained in Rule Statements

Category	State-ments	CT's Contained in Statements	CTP's Contained in Statements	Respondents
Rule				
Goal/objective/task	27	33	71	(16)
Must	2	3	3	(2)
Need/ought/should	22	34	65	(17)
Could/may/might	9	5	36	(5)
TOTAL	60	75	175	(31)*

*Respondents provided an average of 1.9 rule statements each with a range of from one to five statements per respondent.

Rule statements constituted 17% or 60 of the 356 statements provided by respondents. This statement category contained 18% or 75 of the 414 CT's, 16% or 175 of the 1084 CTP's, and 17% or 250 of the 1498 CT's and CTP's.

The third category of statement identified in this stage of analysis was relationship. Statements in this category presented or suggested the existence of relationships between CT's and CTP's. Two subcategories were established and named strict and loose statements. Strict statements directly identified a relationship

between CT's and CTP's in the subject and complement of the statement. Loose statements were divided into present and past/future statements. Loose statements suggested the existence of relationships between CT's and CTP's in a particular period of time; thus, present statements suggested current relationships and past/future statements suggested historical or potential relationships between CT's and CTP's.

Thirty or 53% of the 57 respondents provided 97 relationship statements containing 405 CT's and CTP's. Table 14 details the results of this analysis.

Table 14: CT's and CTP's Contained in Relationship Statements

Category	State-ments	CT's Contained in Statements	CTP's Contained in Statements	Respondents
Relationship				
Strict	60	80	173	(28)
Loose	37	20	132	(17)
(Present)	(25)	(14)	(94)	(13)
(Past/Future)	(12)	(6)	(38)	(9)
TOTAL	97	100	305	(30)*

*Respondents provided an average of 3.2 relationship statements each with a range of from one to ten statements per respondent.

Relationship statements constituted 27% or 97 of the 356 statements provided by respondents. This statement category contained 24% or 100 of the 414 CT's, 28% or 305 of the 1084 CTP's, and 27% or 405 of the 1498 CT's and CTP's.

The fourth category of statements identified was description. Statements in this category described characteristics of, or action taken upon, CT's and CTP's. The category was not further subdivided.

Twenty or 35% of the 57 respondents provided 31 description statements containing 133 CT's and CTP's. Table 15 details the results of this analysis.

Table 15: CT's and CTP's Contained in Description Statements

Category	State-ments	CT's Contained in Statements	CTP's Contained in Statements	Respondents
Description	31	31	102	(20)*

*Respondents provided an average of 1.6 statements each with a range of from one to three statements per respondent.

Description statements constituted 9% or 31 of the 356 statements provided by respondents. This statement category contained 8% or 31 of the 414 CT's, 9% or 102 of the 1084 CTP's, and 9% or 133 of the 1498 CT's and CTP's.

The final category identified in this stage of analysis was unusable. Statements were placed in this category when they could

not be analyzed in the preceding stages because of one or more of the following problems: (1) statements represented the personal opinion of the respondent or were a criticism of current practice based on personal opinion; (2) statements referred directly to the author, title of, or citation from literary works thus providing insufficient information to be analyzed further; and (3) statements were not functional or complete sentences, did not contain at least two concept terms or concept term phrases, or were compound sentences containing two or more categories. Due to the insufficient number of compound statements provided by the respondents, it was not possible to determine a pattern for developing rules and guidelines for categorization.

The unusable category of statements was divided into three subcategories representing the problems noted above. These subcategories were named critique, review, and uncodable statements. The uncodable statements were those which could not be diagrammed and were further divided into unqualified and compound statements. Unqualified statements were those not containing two or more concept terms and concept term phrases, as specified by the questionnaire instructions, or not representing a functional or complete sentence. Compound statements were those which contained two or more complete sentences presented by the respondent as one sentence; thus each compound statement contained more than one subject, verb, and complement.

Twenty-eight or 49% of the respondents returned 58 unusable statements containing 204 CT's and CTP's. Table 16 details the results of this process.

Table 16: CT's and CTP's Contained in Unusable Statements

Category	State-ments	CT's Contained in Statements	CTP's Contained in Statements	Respondents
Unusable				
Critique	25	25	81	(19)
Review	12	16	32	(9)
Uncodable	21	19	31	(14)
(Unqualified*)	(18)	(16)	(20)	(11)
(Compound)	(3)	(3)	(11)	(3)
TOTAL	58	60	144	(28)**

*Of the 18 unqualified statements, 14 contained only one concept term and four were not functional sentences.

**Respondents provided an average of 2.1 unusable statements each with a range of from one to seven statements per respondent.

Unusable statements constituted 16% or 58 of the 356 statements provided by respondents. This statement category contained 15% or 60 of the 414 CT's, 13% or 144 of the 1084 CTP's, and 15% or 204 of the 1498 CT's and CTP's.

All 58 statements in the unusable category were removed from further analysis because of the nature of the statement, i.e.,

critical statements provided no empirical data, or because the statement could not be diagrammed. The remaining 298 statements in the definition, rule, relationship, and description categories were submitted to the final stages of analysis.

As a result of withdrawing all unusable statements from further analysis, it was also necessary to remove the CT's and CTP's corresponding to those statements from further analysis. This rationale was based on the remaining stages of analysis which focused on the CT's and CTP's and the categorized statements which contained them. As a result, the CT's and CTP's contained in the unusable category of statements were deleted from the alphabetical list. CT's and CTP's contained in the unusable category and also contained in at least one of the remaining four categories of statements remained on the alphabetical list, but the duplication was eliminated. Table 17 below details the results of deleting CT's and CTP's in the unusable category of statements.

As a result of deleting those CT's and CTP's occurring only in the unusable category of statements and reducing the number of duplications, 354 of the original 414 CT's and 940 of the original 1084 CTP's remained on the alphabetical list for a combined total of 1294 CT's and CTP's.

Of the 57 original respondents, four provided statements which were identified only in the unusable category. Hence the third, fourth, and fifth stages of analysis attended to those statements submitted by the remaining 53 respondents.

Table 17: CT's and CTP's in Unusable Category of Statements

Category	CT's		CTP's	
	Occurring in Usable Category	Duplicated in Other Categories	Occurring in Usable Category	Duplicated in Other Categories
Usable				
Critique	10	15	63	18
Review	9	7	25	7
Uncodable	8	11	25	6
(Unqualified)	(8)	(8)	(18)	(2)
(Component)	(0)	(3)	(7)	(4)
Sub-Total	27	33	113	31
TOTAL Reduction in the Alphabetical List		60		114

The 354 concept terms and 940 concept term phrases remaining on the alphabetical list and provided in the 298 definition, rule, relationship, and description statements, served as the basis for the remaining stages of analysis. The third stage of analysis specifically reviewed those CT's and CTP's on the alphabetical list.

Combining Concept Terms and Concept Term Phrases

The third stage of analysis focused on the concept terms and concept term phrases contained on the alphabetical list of CT's and CTP's. The 1294 CT's and CTP's on that list included every CT and

CTP identified in definition, rule, relationship, and description statements. This list included duplications of the same CT's and CTP's and singular and plural forms of the same CT's and CTP's. Further, different CT's and CTP's with the same or similar meaning were contained on this list. The primary purpose of this stage of analysis was to reduce the number of CT's and CTP's so that the amount of data could be more readily manipulated during the final two stages of analysis.

Concept terms and concept term phrases listed on the alphabetical list were combined according to five major criteria: (1) exact duplications of CT's and CTP's; (2) singular and plural forms of the same CT or CTP; (3) CTP's containing the same concept terms (in both the singular and plural forms) and adjectives, descriptors, or modifiers (in both the singular and plural forms); (4) CT's and CTP's having the same or similar meanings; and (5) CT's and CTP's representing the same general areas of meaning. These criteria served to reduce the number of CT's and CTP's on the alphabetical list and were sequential in that each criterion was employed in the order presented above.

The first step in the combination process was a review of all CT's and CTP's on the alphabetical list for exact duplications. Of the 354 CT's, 49 were cuplicated 126 times. Of the 1084 CTP's, 46 were duplicated 70 times. All duplications were removed from the alphabetical list leaving a total of 228 CT's and 870 CTP's. Appendix J details those CT's and CTP's which were treated during

the combination process as they were affected by each of the five major criteria for combining.

The second step employed in the combination process attended to the singular and plural forms of all concept terms and concept term phrases remaining on the alphabetical list. Of the remaining 228 CT's, 46 were combined into 23 combinations. Of the remaining 870 CTP's, 18 were combined into nine combinations. (See Appendix J for the resulting CT and CTP combinations.) Combining singular and plural forms of CT's and CTP's reduced the alphabetical list by 23 CT's and nine CTP's. This reduction resulted in a remainder of 205 CT's and 861 CTP's on the alphabetical list.

The third step in the combination process focused on CTP's containing the same singular or plural CT and a same or similar form of adjective, descriptor, or modifier. Identification of concept term phrases during the first stage of analysis distinguished between concept terms modified by prepositional phrases; e.g., goal of instruction became goal: instruction; and concept terms with adjectives or descriptors, e.g., instructional goals became goals (instructional). Where necessary, the use of this third criterion included the combination of singular and plural forms of the CTP. As with the previous phase of combination, CTP's were coded so that the original numbers of duplications were indicated.

Of the remaining 861 CTP's, 18 CTP's containing the same singular or plural form of a concept term and the same or similar form of adjective, descriptor, or modifier were combined into nine combinations (see Appendix J for the resulting combinations).

Combining these concept term phrases reduced the alphabetical list by nine CTP's and resulted in 852 CTP's.

The fourth step in the combination process focused on concept terms and concept term phrases with the same or similar meanings. Of the remaining 205 CT's and 852 CTP's on the alphabetical list, 32 CT's and 18 CTP's were combined to form 23 CT and CTP combinations. (See Appendix J for the resulting 23 combinations.) Resulting totals presented on the alphabetical list were 173 CT's, 834 CTP's, and the 23 CT and CTP combinations.

The fifth and final criterion provided for the combination of CT's and CTP's in which a broader area of similar meaning was defined. For example, whereas learner and student were combined in the fourth phase, education and training were combined in this final phase. This phase also allowed for the combination of CT's and CTP's where previous phrases treated CT's and CTP's apart from each other. The results of this final combination activity, together with those CT's and CTP's treated by the previous criteria, revised again the alphabetical list.

A major combination resulted during this phase with the review of the CT medium(s) (7) and the CTP medium(s) - instruction(al) (2). The results of combining this CT and CTP with other CT's and CTP's reflecting instructional media in general produced a list of CT's and CTP's sufficiently large so as to preclude treatment by the established coding system. As a result, nine CT's, 16 CTP's, and one CTP combination were listed under the general heading

medium(s) (7) - instruction(al) (2). This combination ultimately represented 43 concept terms and concept term phrases.

Twelve CT's, 34 CTP's one CT combination, and four CTP combinations were combined to form 12 CT/CTP combinations (see Appendix J for these results). These combinations resulted in remaining totals of 161 concept terms, 800 concept term phrases, 18 CT and CTP combinations, and 12 CT/CTP combinations. (The 18 CT and CTP combinations were hereafter referred to as CT/CTP combinations and, when added to the 12 CT/CTP combinations noted above, resulted in 30 CT/CTP combinations.) These CT's, CTP's, and CT/CTP combinations were included on the alphabetical list. Table 18 below summarizes the results of the combination process. (See Appendix K for an abstract of the combination process.)

Concept terms and concept term phrases presented in Table 18 were not necessarily affected by only one criterion; that is, the combination process was cumulative. For example, of the 49 CT's originally duplicated, 28 were affected by only that criterion. The remaining 21 CT's were affected by one or more additional criteria for combining. Table 19 summarizes the characteristics of the CT's and CTP's included on the alphabetical list. Within the 30 CT/CTP combinations, 44 CT's and 55 CTP's were included. Of these, 10 CT's and 12 CTP's had been treated by at least one of the first three criteria before being combined into CT and CTP combinations.

Of the 354 concept terms on the alphabetical list, 161 were retained. The combination process reduced the CT's by 193 or 55% of all CT's identified in definition, rule, relationship, and

TABLE 18: Summary of CT and CTP Combination Process

Criteria	CT*	Reduction	CTP*	Reduction	CT/CTP Combination	Reduction
1. Duplication	49	126	46	70		
2. Singular/plural	46	23	18	9		
3. Adjective/Descriptor/ Modifier			18	9		
4. CT and CTP Combinations	32	32	18	18	23	
5. CT/CTP Combinations	12	12	34	34	12	5
TOTAL REDUCTION		193		140		5
TOTAL AFTER COMBINING (Original N = 354 CT 940 CTP)		161		800		30

*Characteristics of the CT's and CTP's combined are provided in Table 19.

Table 19: Summary of Characteristics of CT's and CTP's on the Alphabetical List

Characteristics	CT	CTP
1. CT's or CTP's not affected by the combination process	113	750
2. CT's or CTP's affected only by the criterion for duplication	28	37
3. CT's or CTP's affected only by the criterion for combining singular and plural forms	11	5
4. CT's or CTP's affected by the criterion for duplication and the criterion for combining singular and plural forms	9	0
5. CTP's affected by the criterion for combining same/similar adjectives, descriptors, or modifiers and criteria 2, 3, and/or 4 above	___	8
TOTAL	161	800

description statements. Of the original 940 concept term phrases on the alphabetical list, 800 were retained. The combination process resulted in a reduction of 140 or 15% of all CTP's identified in definition, rule, relationship, and description statements. Of the combined total of 1294 CT's and CTP's, 333 or 26% were combined and reduced. The remaining 961 CT's and CTP's, if combined with the 30 CT/CTP combinations, resulted in a total of 991 units or 77% of the original 1294 units.

The process of combining concept terms and concept term phrases provided the basis for developing the Frequency of Use List. This list contained selected primary nouns identified from among all concept terms, concept term phrases, and CT/CTP combinations on the

alphabetical list. In order to create the Frequency of Use List, it was necessary to generate a listing of all primary nouns contained in the CT's CTP's and CT/CTP combinations on the alphabetical list.

Because concept terms were single word nouns, each of the 161 CT's contained on the alphabetical list were transferred to the new list of primary nouns.

All concept term phrases and CT/CTP combinations were reduced to primary nouns called reduced phrases. These reduced phrases were included on the list of primary nouns and represented 800 concept term phrases and 30 CT/CTP combinations. This reduction process necessitated deleting all adjectives, descriptors, and modifiers from CTP/s and CT/CTP combinations. The coding system was also maintained to indicate the number of original CTP's identified among statements and the original number of CT's and CTP's contained in the CT/CTP combinations.

The 161 concept terms, 800 reduced phrases resulting from CTP/s, and 30 reduced phrases resulting from CT/CTP combinations contained on the list of primary nouns provided the basis for generating the Frequency of Use List. This list represented the numbers of times concept terms and concept term phrases were originally identified within statements, and was developed by identifying CT's and reduced phrases representing at least a four-time appearance within statements. The four-time appearance insured that a concept term or reduced phrase would be found in at

least two statements, the minimum necessary for developing a cluster area.

Two procedures were used to determine a four-time appearance of concept terms and reduced phrases. The first provided for a visual count of multiple appearances of the same primary nouns. The second provided for interpreting the coding system developed during the combination process and represented equivalent appearances of the original concept terms and concept term phrases. For example, the primary noun attitude(s) (4) would receive a visual count of one (1) and an equivalent count of five (5). That is, "attitude" is equal to one (1), "(s)" is equal to one (1) and is an equivalent count, and "(4)" is equal to four (4) and is an equivalent count.

Concept terms on the list of primary nouns representing four or more appearances were labelled primary concept terms (PCT's). Reduced phrases on the list of primary nouns representing four or representing four or more appearances were labelled primary reduced phrases (PRP's). Determining primary reduced phrases resulting from CT/CTP combinations included review of reduced phrases resulting from CTP's and CT's. Determining primary reduced phrases resulting from CTP's included review of CT's. Determining primary concept terms focused only on those concept terms not included in the determination of primary reduced phrases.

When reviewing primary nouns for four or more representative appearances, both singular and plural forms of the nouns were identified. These forms were considered to be the same primary

noun, and the singular form was transferred to the Frequency of Use List with an "(s)" preceding the singular form to represent the existence of a plural form. No changes were made when the primary noun already included an (s) code.

An exception to the treatment of reduced phrases resulting from CT/CTP combinations occurred, which required that the reduced phrase be broken into single primary nouns. Of the reduced phrases, seven exception phrases appeared in which a primary noun occurred in more than one phrase and the phrases in which it occurred differed from one another:

environment/(1)/setting
environment/(1)/surround

means (2)/methods
method/mode(s)

outcomes/potential -
outcomes/output/products/results
possibilities/potentials

In order to determine the number of appearances of these primary nouns accurately, each reduced phrase was converted back to its concept term or concept term phrase as it existed before combining into CT and CTP combinations. Eight concept terms were identified and ten concept term phrases were identified. The concept terms were added to the list of primary nouns, and the CTP's were reduced to ten reduced phrases. These additions to the list of primary nouns resulted in 169 concept terms, 810 reduced phrases resulting from concept term phrases, and 23 reduced phrases resulting from CT/CTP combinations.

A review of the list of primary nouns resulted in the identification of one primary concept term (PCT), 58 primary reduced phrases resulting from CTP's (PRP-CTP), and 18 primary reduced phrases resulting from CT/CTP combinations (PRP-CT/CTP). The primary concept term and primary reduced phrases were contained in the Frequency of Use List (see Appendix L).

The 18 PRP-CT/CTP's reflected reduced phrases and concept terms representing a visual count of 126 and an equivalent count (determined by the coding system) of 69. The 58 PRP-CTP's reflected reduced phrases and concept terms remaining after the identification of PRP-CT/CTP's, representing a visual count of 402 and an equivalent count (determined by the coding system) of 159. The PCT reflected concept terms remaining after the identification of primary reduced phrases, representing a visual count of one and an equivalent count (determined by the coding system) of five. Table 20 summarizes these results as identified from the list of primary nouns.

Combining Statements

The fourth stage of analysis required that groups of statements be developed to serve as a base for evaluating the potential for tentative theory. The Frequency of Use List provided the initial data necessary to begin combining statements into groups.

Primary reduced phrases and the primary concept term were selected for analysis. For each PRP and PCT selected, statements were identified which contained that PRP or PCT. Within each statement, all concept terms and concept term phrases, excluding the

Table 20: PCT's and PRP's Contained in the Frequency of Use List as Identified from the List of Primary Nouns

List of Primary Nouns	Frequency of Use List					
	PRP-CT/CTP N = 18		PRP-CTP N = 58		PCT N = 1	
	Appearances		Appearances		Appearances	
	Visual	Equivalent	Visual	Equivalent	Visual	Equivalent
Reduced Phrases (CT/CTP Combinations)*	39	48				
Reduced Phrases (CTP)	77	16	359	72		
Primary Nouns (CT)	10	5	43	87	1	5
Sub-Total	126	69	402	159	1	5
TOTAL**	195		561		6	

*Reduced phrases resulting from CT/CTP combinations show a visual count higher than the respective number of PRP's because 14 of the PRP's contained more than one primary noun, each noun receiving a discrete count of one.

**These totals represent the number of times the PRP's and PCT appear in statements as CT's and CTP's.

PCT or PRP as it existed as a CT or CTP, were identified. Cluster areas or groups of these CT's and CTP's were then developed according to the potential they had for forming relationships among the statements in which they were contained. The cluster areas then served as the base from which to identify statements and combine them into groups.

Selection of the PCT and PRP's contained on the Frequency of Use List for analysis was guided by the three general criteria developed in Chapter III. The first criterion, PRP's having 20 or more appearances within statements, supported the selection of the PRP's development, system(s), process(s), learning, instruction, and application(s)/use(s). The second criterion, interest areas reflected in the names of the field's professional organization and its divisions, supported the selection of the PRP's communication(s), research, design(s), technology(s), theory(s), education/training, data/fact/information, and medium(s). (Development and system(s) were selected using the first criterion. Management and production did not appear four or more times among statements. As such, they did not appear on the Frequency of Use List.) The third criterion, interest areas of general focus, supported the selection of the PRP's methodology(s), methods, model(s), decision(s), feedback, knowledge, objective(s), behavior(s), evaluation, material(s), instructor/manager/teacher, and learner(s)/student(s). The PCT, attitude(s) was selected because it was the only PCT contained on the Frequency of Use List.

The 26 selected primary reduced phrases and the one primary concept term provided the means by which to identify statements ultimately represented in the groups of combined statements. For each PCT and PRP selected, a review of the 298 definition, rule, relationship, and description statements was made to determine those statements containing the PCT and PRP's

Of the 298 statements, 214 or 72% contained one or more PCT/PRP's. Statements containing the PCT and PRP's were contributed by 45 or 85% of the 53 respondents providing usable statements. Of these 214 statements, 133 contained one PCT or PRP; and the remaining 81 statements contained two or more PCT/PRP's. (Appendix M details the results of these analyses.)

The 214 statements containing PCT's and PRP's provided the means by which to identify concept terms and concept term phrases used in developing clusters. For each statement containing a PCT or PRP, all concept terms and concept term phrases contained within that statement were identified. Those CT's and CTP's reflecting the PCT or PRP being reviewed were separated from the remaining CT's and CTP's identified in the statement because they represented the focus for developing the clusters.

Of the original 354 concept terms identified in definition, rule, relationship, and description statements, 283 or 80% were identified in statements containing a PCT or PRP. Of these 283 CT's, 139 were representative of a PCT or PRP, leaving 144 CT's to be reviewed for clustering. Of the original 940 concept term phrases identified in definition, rule, relationship, and description

statements, 685 or 73% were identified in statements containing a PCT or PRP. Of these 685 CTP's, 275 were representative of a PCT or PRP, leaving 410 CTP's to be reviewed for clustering. (Appendix N details the results of these CT and CTP analyses.)

Clusters were developed by identifying similarity of meaning and/or general areas of focus reflected by concept terms and concept term phrases identified in statements containing each individual PCT and PRP. Once developed, the clusters provided the means by which to combine statements into groups.

Clusters appeared to develop around similar meaning and general areas reflecting the concepts of learning and the learner, instruction, instructional development, and media and technology. These areas surfaced during the clustering activity and were not predetermined by the researcher. Each cluster contained at least four concept terms and/or concept term phrases, since four was the number determined to be the minimum from which most clusters would represent two or more statements. (A minimum of two statements was needed to form a statement group.)

Figure 3 presents two clusters which resulted from reviewing the 13 CT's and 18 CTP's identified in statements containing the PRP objective(s).

As shown in Figure 3, cluster 1, developed around the PRP objective(s), contained the CT's and CTP's input, output, visibility: process (learning), capabilities (assessment), and results: sequence (instructional). Cluster 2 contained the CT's and CTP's learner, psychology (learning), learning, differences: learning

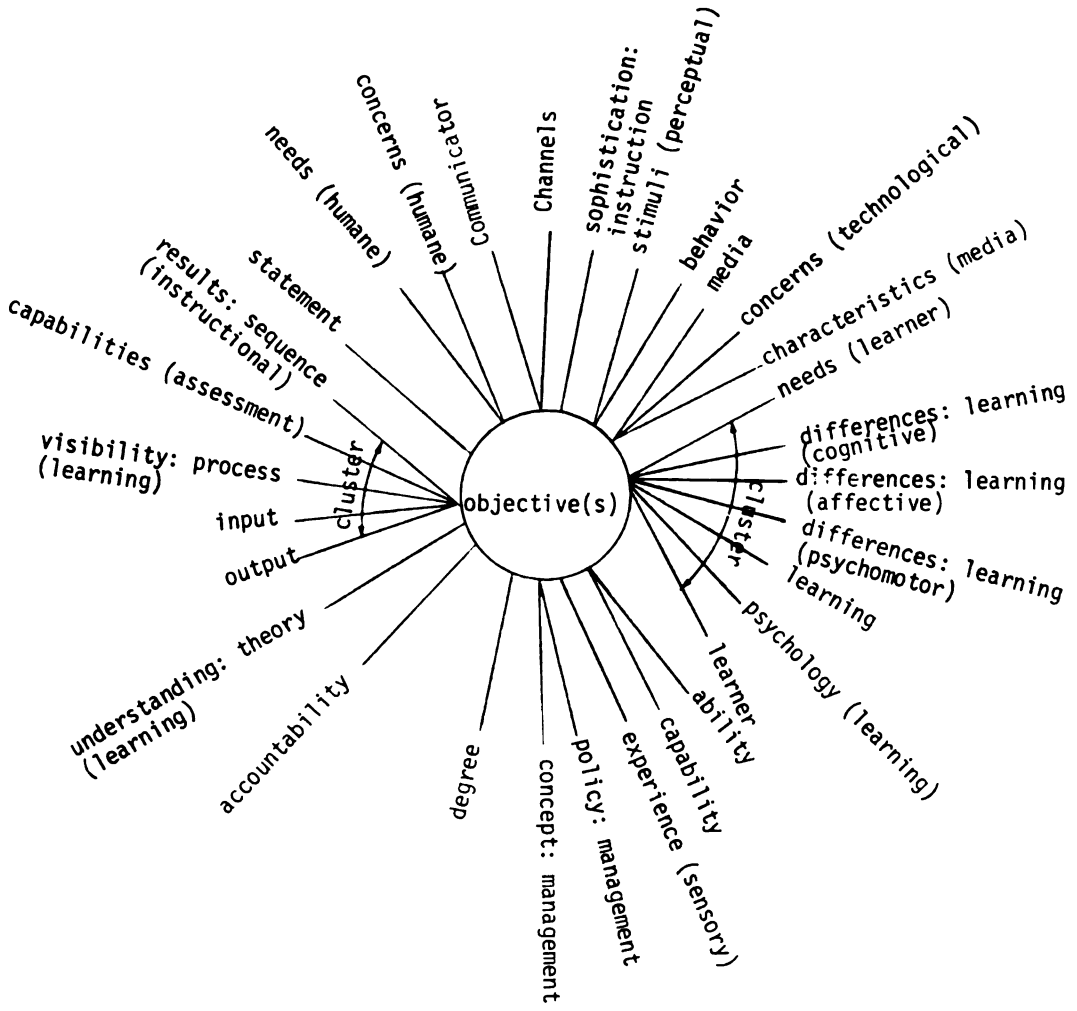


Figure 3: Diagram of the PRP objective(s) and its Clusters.

(psychomotor), differences: learning (affective), and differences: learning (cognitive). These two clusters focused, generally, on the areas of learning and the components of instruction. (See Appendix O for an example of the individual procedures used to develop clusters and combine groups of statements.)

From the one PCT and 26 PRP's selected for review, 69 clusters were developed around the PCT and 22 PRP's. These 69

clusters reflected four general areas of emphasis: the learner and learning, instruction, instructional development, and media/technology. Fifty-four, or 78.3% of the clusters represented these areas and reflected 23 PCT/PRP's. Table 26 presents a summary of these results.

Table 26: Frequency of General Areas as Reflected by Clusters

General Areas	Number of Clusters Formed	% of N (N = 69)
1. Learner and learning		35
learner	11	
learning	11	
learner and learning	2	
2. Instruction		17
instruction	5	
instructional content	1	
instructional materials	2	
instructional methods	1	
instructional process	1	
instructional strategies	1	
teaching strategies	1	
3. Instructional development	10	15
4. Media/technology		12
materials production	1	
media and information	1	
media and technology	6	
5. Miscellaneous	15	22
TOTAL	69	101*

*Total not equal to 100.0% due to rounding.

While 23 PCT/PRP's resulted in 69 clusters, four PRP's did not appear to contain general foci sufficient to form clusters. For example, the PRP feedback was contained in seven statements in which seven CT's and 14 CTP's were identified. Figure 4 presents the results of the attempt to develop clusters around this PRP.

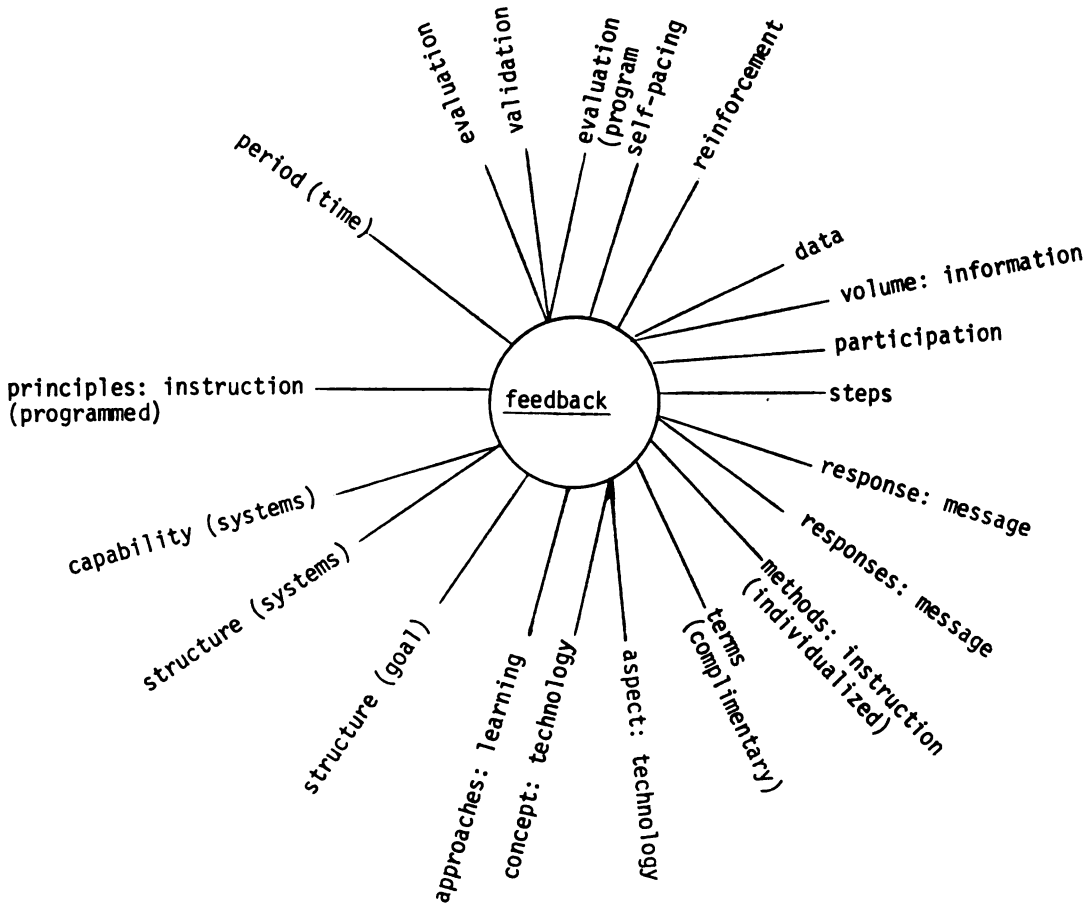


Figure 4: Diagram of the PRP feedback.

As shown in Figure 4, there are not four or more CT's and/or CTP's which support the development of a cluster. Because clusters were not developed for the PRP's feedback, method(s), methodology(s), and model(s), statement groups were not formed for these PRP's. (See Appendix P for a summary of the analysis of the PCT and 26 PRP's reviewed and the resulting 69 clusters.)

Because four CT's and/or CTP's were required as a minimum number to form a cluster, all 69 clusters represented a potential statement group. Two exceptions occurred with the PRP-CTP technology(s) and the PRP-CT/CTP education/training. One cluster developed around each of these PRP's included CT's and CTP's contained in only one statement. For example, from the PRP technology(s), one of the three clusters developed contained the following CT's and CTP's: film, tapes, books, newspapers, strips (film), strips (sound), and microfilm. These CT's and CTP's were all contained in only one statement, i.e., Videodisc technology is such a pervasive change agent that it will likely replace most films, tapes, books, newspapers, "hi-fi," sound film strips, and microfilm. As such, no statement group could be formed. A similar situation existed with a cluster surrounding education/training. Because one cluster each from the PRP's technology(s) and education/training did not represent two or more statements to form a statement group, the 69 clusters formed resulted in 67 statement groups.

Of the 214 statements containing PCT/PRP's selected for review, 141 were combined into 67 resulting statement groups. Of

these 141 statements, 81 were contained once in a statement group, and one statement was included in 14 statement groups. Seventy-three statements containing one or more PCT/PRP's were not included in a statement group. This was due to the CT's and CTP's contained within these statements not being included in the 69 clusters developed. Table 27 summarizes the details of this statement analysis.

The 69 clusters resulted in the identification of 67 statement groups. These groups contained from two to ten statements each. Of the 18 primary reduced phrases (CTP), eight primary reduced phrases (CT/CTP), and one primary concept term selected from the Frequency of Use List, 69 clusters were developed around 14 PRP-CTP's, eight PRP-CT/CTP's, and one PCT. From these 69 clusters, 67 statement groups were identified. These statement groups provided the basis for the fifth and final stage of analysis, identification of tentative theories.

Identification of Tentative Theories

The fifth and final stage of analysis provided for the examination of statements to determine the existence of trends between and among the primary concept terms and primary reduced phrases, and to identify tentative theories as they may exist within the groups of statements formed as a result of the clusters.

In determining trends between and among the PCT and PRP's, ten PRP's were identified in all four categories of statements; the PCT and 11 PRP's were identified in three categories; and five PRP's

Table 27: Statements Contained in Statement Groups

Statements	Number of Statement Groups									. . .	
	0	1	2	3	4	5	6	7	8		14
Definition											
Equal	23	16	3	4	3	0	1	0	0		0
Congruent	0	3	1	0	0	0	1	0	0		0
Component	9	9	4	2	0	0	1	1	0		1
Rule											
Goal/Objective/Task	0	1	0	0	0	0	0	0	0		0
Must	4	8	1	3	1	0	0	0	0		0
Need/Ought/Should	3	5	3	2	0	1	0	0	0		0
Could/May/Might	2	2	1	0	0	0	1	0	0		0
Relationship											
Strict	10	19	5	5	1	1	2	0	0		0
Loose	11	10	4	1	0	0	0	0	1		0
Present	(7)	(6)	(4)	(1)	(0)	(0)	(0)	(0)	(1)		(0)
Past/Future	(4)	(4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)		(0)
Description	11	8	4	1	0	0	0	0	0		0
Sub-Total:	73	81	26	18	5	2	6	1	1		1
TOTAL	73					141					

were identified in two categories of statements. The PCT and 24 PRP's were contained in definition statements; the PCT and 18 PRP's were contained in rule statements; the PCT and 25 PRP's were contained in relationship statements; and 16 PRP's were contained in description statements. Further, the PCT and 26 PRP's were identified 67 times in the subjects of the statements; 67 times in the complements of the statements; and 11 times in both the subject and complement of the statements. (Appendix Q presents a summary of the PCT and PRP's as they were contained in the subject and complement of each category of statement.)

Of the original 298 definition, rule, relationship, and description statements, definition and relationship statements represented 70% of the total. In a comparison of the total 214 statements containing the PCT and PRP's, definition and relationship statements constituted 71% of this total. Table 30 details these results.

Table 30: Comparison of the Usable Statements to Statements Containing PCT/PRP's

Statement Category	Usable Statements	% (N=298)	Statements Containing PCT/PRP's	% (N=214)
Definition	110	37	82	38
Rule	60	20	38	18
Relationship	97	33	70	33
Description	31	10	24	11
TOTAL	298	100	214	100

The 214 statements containing PCT/PRP's represented 72% of the 298 definition, rule, relationship, and description statements. Comparing the statement categories containing the 298 statements with the statement categories containing the PCT and PRP's veveals no substantive difference to indicate any trends in the occurrence of PCT/PRP's within statements.

Position of the PCT and PRP's within the subject and complement of statements was further analyzed. Each PCT and PRP was individually reviewed to determine trends. PCT/PRP's identified four or more times within a particular category of statement were reviewed. Twelve primary reduced phrases were identified:

development	process(s)	application(s)/use(s)
evaluation(s)	system(s)	instruction
feedback	technology(s)	learner(s)/student(s)
learning	theory(s)	medium(s) and combined list

(Individual statements containing these PRP's are presented in Appendix R.) Each PRP was contained four or more times in either the subject or complement of the definition, rule, relationship, and description statements. The set of four or more statements provided the basis for the following analyses.

PRP's contained in the complement of definition statements were part of a variety of definitions of other PRP's, concept terms, and concept term phrases. A review of the PRP's contained in the complement of definition statements as presented in Appendix R supports this observation. As such, the existence of any clear trends was not identified. The PRP development provides a particularly good example of this observation. Development was identified

in the complement of seven definition statements. A review of these statements produced definitions for learning, instructional systems development process, empirical inquiry technology base, application of the systems concept, general systems theory, formative and summative evaluation, and observable differences (between children of different social classes). No trends were observed in this or other instances when PRP's were contained in the complements of definition statements.

Of the 12 PRP's reviewed, only learning was identified in the complement of rule statements. (No PRP's were identified four or more times in the subject of this category.) There was no apparent trend in rule statements as the PRP was included in the complement and referred to with regard to community involvement, research, media, and the use of cognitive style.

Likewise, system(s) was the only PRP identified four or more times in description statements. This PRP was contained in the subject of four statements and described in terms of cognitive system, television system, general system, and management system. No apparent trend in the use of this PRP within the description category was evident upon review.

Statements defining concept terms and concept term phrases (i.e., those PRP's contained in the subject of definition statements) and statements relating concept terms and concept term phrases to each other (i.e., PRP's contained in the subject or complement of relationship statements) proved the major focus in this phase of analysis.

Seven of the 12 PRP's appeared in the subject of definition statements. Of these seven, each was presented as a concept term phrase at least once. For example, the PRP technology(s) included educational technology, instructional technology, and video disc technology; instruction was identified to include visual instruction and competency-based instruction; and evaluation(s) as program evaluation, formative evaluation, summative evaluation, and summative evaluation (of programs). All seven PRP's were directly defined in the complement of the statements, except in one instance where, as part of the subject, technology(s) was referenced as applying to the term defined, i.e., learning theory, as applied to educational technology . . . .

Further observations were made regarding learning, technology(s), theory(s), and instruction. Learning was the subject of six definition statements. Of these six, four referred directly or indirectly to human behavior or characteristics. Of these four, two reflected consistency in reference to permanence or retention of a change in behavior/disposition.

Technology(s) was included in the subject of seven statements. Of these, six directly defined the PRP. Two of the statements treated the PRP as a process, two directly presented a perspective of hardware technology, one alluded to this perspective, and one defined the PRP as techniques.

Theory(s) was directly defined in four statements as learning theory, theory of instruction, and general systems theory.

Three of these four statements incorporated human behavior or characteristics into the definition.

Instruction was defined in four statements. Of these four, three made direct reference to learning in the definition.

Of the statements defining the PRP's learning, technology(s), theory(s), and instruction, no one set of statements presented a consistent definition even though similarities between definitions for each PRP were observed.

Among the twelve PRP's selected for further analysis, five were identified in relationship statements: learning, application(s)/use(s), instruction, learner(s)/student(s), and medium(s) and combined list. Because of the variety of references contained in application(s)/use(s), no further analysis was attempted.

Learning was contained in six relationship statements. There did not appear to be any consistent relationships presented between the PRP and other terms within the statements; however, the following concept terms and concept term phrases were identified in statements related to or affecting learning:

size: task (learning)	presentations (multi-media)
self-pacing (student)	objectives
amount: participation	method: instruction
type: participation	time: reading
schedule: reinforcement	conditions
amount: time (learning)	means (visual): learning
setting (instructional	realism: instruction
model: instruction	development (instructional)

Instruction was contained in the complement of four relationship statements. No clearly defined relationships appeared from this set of statements.

Learner(s)/student(s) was included in the complements of five relationship statements. Two of these statements related the PRP to the learning environment and learning space.

Medium(s) and the combined list were identified in five relationship statements as the subject of these statements. No consistent relationships were observed among the statements in this category.

While this phase of analysis revealed no specific trends within statements containing the twelve PRP's, there were similarities presented in statements containing the PRP's learning, technology(s), theory(s), instruction, and learner(s)/student(s). Moreover, there are general observations which can be made about these PRP's and the statements containing them:

1. The absence of any clearly observable trends may, in and of itself, be characteristic of a developing field such as educational communications and technology.

2. No apparent relationships existed among statements which included the PRP's as part of the complement, particularly as they were contained in definition statements.

3. While relationship statements related PRP's to other PRP's, concept terms and concept term phrases within individual statements, no clearly defined relationships were identified among statements containing the selected PRP's.

4. Of the twelve PRP's reviewed, ten were contained in definition statements. Of these ten, five were included in the subject, three were included in the complement, and two were contained in both the subject and the complement of the statements. Relationship statements represented five of these twelve PRP's, and rule and description statements each represented one PRP.

5. The five PRP's contained in the subject of definition statements appeared in a total of 33 statements. Each statement, with the exception of one, directly defined the PRP. While similarities of selected PRP definitions were observed, there was a general absence of any trends.

The final phase of analysis focused on an evaluation of the statement groups developed from the clusters. The purpose of this analysis was to determine the existence of tentative theories represented by these groups of statements. Adaptation of Bern's (1968) criteria for evaluating theory, presented in Chapter III, provided the means for assessment. Each statement group was evaluated in terms of its ability to account for the treatment of events (or phenomena) specified within it and defined by the criteria. The following list summarizes these criteria:

1. Explanation: Are events described and their occurrence explained?

2. Prediction: Are future events predicted, or do events described serve as sufficient evidence from which to predict future events?

3. Clarification: Are the purposes of events or manners of occurrence clarified? Are definitions of events refined?

4. Summarization: Are purposes, manners of occurrence, or definitions of events adequately summarized?

5. Mediation: Is sufficient information provided so that current knowledge of the events can be adapted to new situations?

6. Experimentation: Is support and direction provided for present and future research of the event?

7. Organization: Is a structure for the event suggested?

8. Exploration: Are new events or manners of occurrence suggested?

9. Mensuration: Can events be quantified? Are new methods of quantification suggested?

10. Commonality: Are generalizable characteristics of events or manners of occurrence presented which apply to events within and among statement groups?

11. Interdisciplinarity: Are events or manners of occurrence of sufficient value to disciplines contributing to the field to support inspection by those dicsiplines?

12. Contemporaneity: Are the specified events applicable to the present, as well as the future?

Each of the 67 statement groups was analyzed by applying these criteria. The events (or phenomena) presented within each group were identified by the primary concept term and primary reduced phrases from which the cluster was developed. Events (or phenomena) were further defined by the area represented by the clusters and identified during the fourth stage of analysis. For example, the PCT attitude(s) defined the phenomenon for which a statement group was developed. The cluster of concept terms and concept term phrases supporting the development of the statement group was identified as "components of instructional development." The events (or phenomena) were identified in this manner for each statement group. Each group was then reviewed and assessed according to the demands of the criteria.

Of the 67 statement groups developed, 23 generated from PRP clusters were identified as having potential for suggesting tentative theories. Selection of these 23 statement groups was based upon the criteria for evaluating tentative theory and the identification of a singular focus, or clearly defined foci, within the

statements. While the PRP's provided the foci for developing the clusters, the statements representing the concept terms and concept term phrases within the clusters emphasized those CT's and CTP's in a random manner. As such, statement groups not selected appeared to be a random collection of statements containing in common only the PCT or PRP and the CT's and CTP's included in the cluster. These groups of statements did not conform to any of the criteria used to identify tentative theories. For example, the PRP behavior(s) included Statement Group 1, developed from a cluster of CT's and CTP's associated with learning. The phenomenon "behavior," further defined by "learning," was represented by statements which did not appear to contain a central focus. As a result, the statement group was not among the 23 statement groups selected, due to the appearance of a random collection of various ideas.

The statement groups selected for further review contained identifiable foci. For example, Statement Group 1, developed from a cluster for the PRP learning, directed attention to the notion of learning styles. This statement group was selected among the 23 statement groups for further analysis.

The 23 statement groups selected represented 12 PRP's and include the following: design(s) (statement group 2); learning (statement groups 1, 4, 9, 10); objective(s) (statement groups 1, 2); process(s) (statement groups 1, 2, 4); research (statement group 2); technology(s) (statement groups 1, 2); theory(s) (statement group 2); data/fact/information (statement group 2); instruction (statement groups 1, 4); learner(s)/student(s)

(statement groups 1, 3, 4); material(s) (statement group 2); and medium(s) and combined list (statement groups 1, 3). (See Appendix S for a presentation of these statement groups.) In determining the potential these statement groups held for suggesting tentative theories, the foci for the groups were defined and the statement groups assessed against the criteria. To be judged as having potential for tentative theory, a statement group was required to fulfill minimum criteria: explanation, clarification, mediation, commonality, and contemporaneity. These criteria were defined as minimum standards because of their influence upon defining events (or phenomena) and the generalizability of information surrounding these events. The results of the analyses of the 23 selected statement groups are presented in the following pages. The statement groups are identified by the primary reduced phrases they represent and the number of the statement group developed (see Appendix S).

Tentative Theory Analysis

The following discussion presents the analysis of statement groups. These analyses resulted from the process which focused on the identification of tentative theories.

Statement Group 2 for the PRP design(s) was developed from a cluster area related to components of instructional development. The foci of this statement group were directed toward instructional design as a process and learning as an outcome of this process. Emphasis was placed upon the components of the process which include planning, design, production, presentation, testing, revision, and

evaluation of instruction. While the statement group explained the event, suggested a structure in the presentation of the components of the process, provided generalizable characteristics applicable to development, and appeared to relate to present as well as future occurrences, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP learning was developed from a cluster area related to learner characteristics. The foci of this statement group were directed toward learning as it related to learning styles and instructional considerations. These considerations included motivations, experiences, resources to include media, message to include content, and instructional setting. It appeared that this statement group was able to explain learning in terms of attending to learning style and provide minimal direction for future research with regard to mastery and hierarchical learning and instructional design. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 4 for the PRP learning was developed from a cluster area related to components of instruction. The focus of this statement group was suggestive of instructional development concerns. These concerns included job, task, and data analysis, learning experiences, and learning tasks. However, this statement group did not meet any of the minimum criteria suggestive of tentative theory.

Statement Group 9 for the PRP learning was developed from a cluster area related to media and information. The focus of this

statement group was directed toward the effects of a message upon the learner and included attention to information processing, the reality of the message, the relationship of the message to learner traits, and stimulus presentation. It appeared that this statement group provided direction for experimentation in the areas of stimulus presentation and perceptual cues, suggested commonality in the areas of instructional design and development for the effects of the message upon the learner, and supported a contemporaneous phenomenon. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 10 for the PRP learning was developed from a cluster area related to the learning environment, which also defined the focus for this group. Emphasis was placed upon persons responsible for creating the environment, its components, and its purpose. While the environment was explained, this statement group did not appear to meet the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP objective(s) was developed from a cluster area related to learning. The focus of this statement group was on the learning objective, with emphasis placed upon the need to define the learning before it can occur. While the phenomenon was explained, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 2 for the PRP objective(s) was developed from a cluster area related to components of instruction. The focus of this statement group was directed toward including objectives as

part of the process for which learning is an outcome. This statement group presented two perspectives on objectives which appeared unique and suggested that the criterion of exploration might be met. The first was the notion of increasing "the visibility of the learning process" so as "to better identify and monitor" the accomplishment of objectives. The second perspective suggested that objectives be defined "relative to full human needs" and not to limit learning objectives by "assessment capabilities." However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP process (s) was developed from a cluster area related to learning. The cluster area description also provided the focus for the statement group. The statement group satisfactorily explained the phenomenon and supported the criterion for contemporaneity. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 2 for the PRP process(s) was developed from a cluster area related to the components of instructional materials production. The focus of this statement group was on the development of instruction as a systematic process. This statement group supported commonality in that the characteristics of the process as presented can be applied to design and development and contemporaneity. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement group 4 for the PRP process(s) was developed from a cluster area related to systems which, with process, served

also as the focus of the statement group. Emphasis was placed upon the components of a developmental process to include system analysis and design, system development, and system management. This statement group provided an explanation of the phenomenon and appeared to support contemporaneity. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 2 for the PRP research was developed from a cluster area related to media and technology. The focus of this statement group was directed toward behavior, perception, and stimulus presentation. Each statement in the group suggested research in areas related to the behavioral processes, experimental rather than descriptive domains, stimulus presentation, and perceptual systems. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Groups 1 and 2 for the PRP technology(s) were developed from cluster areas related to components of communications and systems. Both were unique in that their emphasis was not on technology as hardware. Statement Group 1 provided foci for messages and information; Statement Group 2 directed a focus toward instructional development. However, neither statement group met any of the minimum criteria suggestive of tentative theory.

Statement Group 3 for the PRP theory(s) was developed from a cluster area related to the components of instructional development. The general focus was directed toward these components as they included analysis of learner characteristics, materials and content, learning goals, and instructional strategies. This statement group

adequately explained the phenomenon, suggested commonality in the areas of instructional design and development for the characteristics of instructional development, and supported contemporaneity. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 2 for the PRP data/fact/information was developed from the cluster area related to evaluation and served as the foci for the group. Emphasis was placed on data and information as the major components of evaluation. The statement group appeared to adequately explain the phenomena in terms of evaluation. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP instruction was developed from the cluster area related to learning. The focus of this statement group was directed toward the relationship between instruction and learning and emphasized purpose, definition, learner traits, and development. The statement group provided sufficient explanation of the phenomenon and contained characteristics providing commonality with development, learning, and learners. It also appeared to be contemporaneous. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 4 for the PRP instruction was developed from a cluster area related to instructional development. The focus of this statement group appeared to be directed toward instruction that is designed and developed. However, this statement group did not meet any of the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP learner(s)/student(s) was developed from the cluster area related to learner characteristics. The foci of this statement group were directed toward learner behavior and differences among learners as they relate to instructional design. The criteria for commonality appeared to apply not only to the phenomenon, but also to learning, design, and development. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 3 for the PRP learner(s)/student(s) was developed from the cluster area related to components of instructional development. The focus of this statement group appeared directed toward the required considerations for instructional development. These included goals, analysis of learner characteristics, instructional materials, instructional strategies, instructional modes, learning environment, and achievement of learning objectives. The statement group appeared to sufficiently explain the phenomenon and supported commonality with learning, design, and development. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 4 for the PRP learner(s)/student(s) was developed from a cluster area related to components of evaluation. The focus of this statement group was directed toward the modes for sending messages to the learner. The statement group was considered contemporaneous in that the PRP was the focus of both present and future concerns. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 2 for the PRP material(s) was developed from the cluster area related to components of instruction and focused on information and instructional materials. The statement group supported commonality with the areas of design, development, and learning. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 1 for the PRP medium(s) and the combined list was developed from the cluster area related to the learner. The focus of this statement group was directed toward media forms employed to transmit instructional information. The statement group appeared to adequately explain the phenomenon and presented clarification in the purpose and occurrence in the use of media. The statement group also supported commonality with instructional design and development and learning. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Statement Group 3 for the PRP medium(s) and the combined list was developed from the cluster area related to components of communications and focused on communication channels as they affect learning. The statement group presented sufficient explanation to fulfill that criterion and appeared to support commonality with instructional design and development, learning, and learners. However, this statement group did not meet the minimum criteria suggestive of tentative theory.

Thus none of the 23 statement groups selected for evaluation met the minimum criteria; therefore, no tentative theories are

suggested. Table 31 summarizes the criteria which were accounted for in the 23 statement groups.

Table 31: Criteria Accounted for in the Statement Groups

PRP	Statement Group	Explanation*	Prediction	Clarification*	Summarization	Mediation*	Experimentation	Organization	Exploration	Mensuration	Commonality*	Interdisciplinarity	Contemporaneity*	Minimum Criteria Met: Yes	Minimum Criteria Met: No
Design(s)	2	X						X			X		X		X
Learning:	1	X					X								X
Learning:	4														X
Learning:	9						X				X		X		X
Learning:	10	X													X
Objective(s):	1	X													X
Objective(s):	2								X				X		X
Process(s):	1	X											X		X
Process(s):	2										X		X		X
Process(s):	4	X											X		X
Research:	2						X								X
Technology(s):	1														X
Technology(s):	2														X
Theory(s):	2	X									X				X
Data/fact/information:	2	X													X
Instruction:	1	X									X		X		X
Instruction:	4														X
Learner(s)/student(s):	1										X				X
Learner(s)/student(s):	3	X									X				X
Learner(s)/student(s):	4												X		X
Material(s):	2												X		X
Medium(s):	1	X		X							X				X
Medium(s):	3	X									X				X
TOTAL		12	0	1	0	0	4	1	1	0	9	0	9	0	23

*Minimum criteria.

Observations

While none of the 23 statement groups met the minimum criteria for being identified as tentative theory, a number of observations concerning the results of this analysis are apparent. First, the criteria fulfilled with the highest frequency were explanation, commonality, and contemporaneity. These criteria constitute three of the five required in the identification of tentative theory. It is possible that the remaining two criteria, mediation and clarification, were not so easily accounted for because of the lack of information included in the formation of clusters and the resultant statement groups. While this study was not designed to combine statement groups, it would be possible to do this based upon the cluster areas defined and the foci of the statement groups identified. Combining statement groups into larger groups of statements may, in fact, provide the additional information necessary to meet the remaining criteria.

A second observation suggests that the criteria which received the greatest attention, i.e., explanation, commonality, and contemporaneity, would appear to provide a profile of the field of educational communications and technology in terms of the professional efforts to define this field. The first criterion, explanation, is necessary in order for the events or phenomena for which a field is accountable to be explained. The second criterion, commonality, which exists between statements containing the primary reduced phrases design, development, learning, process(s), instruction, and learner(s)/student(s), would suggest strong relationships

among these events and phenomena. These relationships in and of themselves may have the potential to suggest tentative theories. The third criterion, contemporaneity, would appear to support the notion that the field is concerned with basic issues of relevance to education generally, both for the present and the future.

A final observation focuses on the lack of attention provided to the remaining criteria. This may propose that the field, in fact, is in its developmental stages. While three primary reduced phrases attended directly to the criterion experimentation, only one fulfilled the criterion for organization or presentation of a structure. It would appear that this lack of organization would discourage clearly defined experimental direction and support. Similarly, the lack of attention to experimentation would also discourage the ability to meet the criterion, exploration.

Chapter Summary

Chapter IV has presented the results of the research as developed from the application of a five-stage analysis of data designed to identify tentative theory. The original data for this study was provided by members of the Research and Theory Division, Association for Educational Communications and Technology.

The respondent population was defined as the 178 members of the Research and Theory Division living in the continental United States. The data used in this study was provided by 57 respondents who returned a questionnaire developed specifically for the study.

Results of the analysis of demographic data revealed that over one-half of the respondents were characterized by: membership in the Division of Instructional Development; the doctoral degree; graduate degrees in the area of educational communications and technology; primary professional responsibility in teaching in institutions of higher education; employment in the field of educational communications and technology for one to ten years; an age of 31 to 50 years; and male sex.

Analysis of the data from the questionnaire was conducted in five stages. The first stage of analysis provided for the identification of concept terms and concept term phrases within statements. Four hundred and fourteen concept terms were identified and 1082 concept term phrases were identified within the respondents' statements.

The second stage of analysis focused upon the statements. Categories of statements were defined to include definition, rule, relationship, description, and unusable statements. Of the total 356 statements submitted by the respondents, 110 were categorized as definition statements, 60 as rule statements, 97 as relationship statements, 31 as description statements, and 58 as unusable statements. The remaining three stages of analysis utilized the 298 usable statements representing the categories, definition, rule, relationship, and description.

The third stage of analysis provided for combining concept terms and concept term phrases. From the 298 usable statements, 354 concept terms and 940 concept term phrases were identified. The

combination process employed five criteria developed to reduce the number of concept term and concept term phrase units identified. Combining concept terms and concept term phrases resulted in a total of 161 concept terms, 800 concept term phrases and 30 concept term/concept term phrase combinations.

The third stage of analysis also generated a Frequency of Use List. This list represented concept terms, concept term phrases, and concept term/concept term phrase combinations which appeared four or more times within the statements provided by the respondents. This list was developed by reducing all concept term phrases and concept term/concept term phrase combinations to single nouns. This reduction process resulted in a list of primary nouns representing 169 concept terms; 810 primary nouns, called reduced phrases, and representing concept term phrases; and 23 primary nouns, called reduced phrases, and representing the concept term/ concept term phrase combinations. A frequency count of these primary nouns was made to determine a four-time appearance within statements. The Frequency of Use List which resulted contained one concept term, called a primary concept term, and 76 reduced phrases, called primary reduced phrases.

The fourth stage of analysis combined statements into groups. Primary concept terms and primary reduced phrases were selected from the Frequency of Use List. Statements containing these PCT's and PRP's were identified and the concept terms and concept terms contained in these statements developed into clusters.

Statements containing the CT's and CTP's contained in each cluster were identified and combined into statement groups.

One primary concept term and 26 primary reduced phrases were selected from the Frequency of Use List. For each PCT and PRP selected, statements in which each was contained were identified. The concept terms and concept term phrases within these statements were identified. Clusters were developed around general areas represented by the CT's and CTP's. Each cluster represented the CT's and CTP's contained in statements which also contained the particular PCT or PRP under review. Clusters were formed for the PCT and 22 PRP's. Of the 69 clusters formed, 54 reflected the areas of learning and the learner, instruction, instructional development, and media/technology.

These clusters then served to identify statements which were combined into groups. For each cluster formed, statements containing the concept terms and concept term phrases included in the cluster were identified and grouped according to the cluster represented. Sixty-seven statement groups were formed in this manner.

The fifth and final stage of analysis provided for the review of statement groups developed from the clusters and an analysis of all statements containing primary concept term/primary reduced phrases. Statements containing the primary concept term and primary reduced phrases were reviewed to determine the existence of any trends either among the categories of statements or the placement of those primary concept term/primary reduced phrases within the statements. Although no significant trends were

identified, selected primary reduced phrases were represented in a larger number of definition statements than in other categories.

The statement groups were reviewed to determine the existence of tentative theories. Twelve criteria were employed to evaluate these statement groups. Of the 67 statement groups developed, 23 were selected for further analysis. None of these 23 appeared to meet the minimum criteria established for suggesting tentative theory; however, these findings do not negate the existence of tentative theory. Rather, they suggest that the field of educational communications and technology is at a stage in its development whereby explanation of issues is being developed, relationships between these issues are being examined, and the issues themselves are current.

Chapter V presents the conclusions drawn from this study, an assessment of the five-stage analysis of data, and recommendations for future research.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The conclusions and recommendations of the study are presented in this chapter, which is organized into four sections. The methodology developed and employed in the study is assessed in the first section. The conclusions formulated as a result of the study are set forth in the second section. In the third section, recommendations and the implications for future research are discussed. This chapter concludes with observations regarding the study.

Assessment of Methodology

The attempt to identify tentative theories in the field of educational communications and technology was structured by procedures incorporated into the design of a five-stage analysis of data. Original data were collected from members of the Research and Theory Division of AECT by means of a questionnaire designed by the researcher. The responses to this questionnaire were statements presenting concepts relevant to the field and to each other and reflecting the respondents' perspective of the profession.

The five-stage analysis procedure which treated those statements is assessed first, and then attention is given to the survey

instrument as it affected the raw data and influenced the methodological design.

First Stage of Analysis

Definition and identification of concept terms and concept term phrases was intended to reflect a grammatical structure representative of major concepts presented within the statements. The diversity of terminology employed by the respondents and the varied interpretation of this terminology among professionals resulted in a methodology which focused upon grammatical structure rather than an interpretation of meaning or content. Further, the methodology required that concept terms and concept term phrases be contained in a standard format which would permit individual treatment in subsequent stages of analysis.

Development of the methodological design and identification of concept term phrases was influenced by the use of multiple adjectives, descriptors, and modifiers for individual concept terms. This necessitated breaking down the concept term phrases into clearly identifiable terms. For example, instructional systems development became development (instructional) and development (systems). The intent of this procedure was to focus upon the concept term, i.e., development, and to identify its adjectives, descriptors, and modifiers.

Another influence was that of interpretation. If a respondent clearly differentiated instructional systems development from instructional development, or if the respondent's emphasis was

on instructional systems rather than on development, there was no objective means to determine the focus. The methodology provided a grammatical focus, and the noun became the major component identified as a concept term.

From an assessment of the first stage of analysis, the following strengths and weaknesses are summarized:

Strengths: The methodology provided a means by which the complexity of the language contained in statements could be accommodated and standardized.

The methodology supported the determination of foci as presented in the data.

Weaknesses: The methodology endangered an accurate, substantive interpretation of the respondents' intent of meaning.

The methodology produced a mass of data which became extremely cumbersome to treat in the third stage of analysis.

Second Stage of Analysis

The methodology designed for this stage was influenced by the demand to distinguish objectively lucid statements from those which were grammatically unstructured and not intelligible. While identification of statement categories was simplified by the rules and guidelines, the statements were sometimes difficult to categorize. This difficulty suggests that the categories defined may be incomplete or the means for identifying statements inadequate. For example, there were a number of statements suggesting research in various areas. While these statements were classified as rule statements and placed under the subcategories of "need/ought/should"

it may have been more appropriate to define an additional category labelled "research."

Categorization of unusable and definition statements was least difficult. These statements were easily identified because of their characteristics. Unusable statements clearly contained personal opinion, reference to author and/or title, grammatical errors, two complete sentences grouped into a compound sentence, and/or less than two CT's and/or CTP's. Definition statements were easily identified because of the verb.

Identification of rule statements was strongly directed by the definition of terms used in the subcategories, i.e., goal, must, need, could, etc. While statements in this category were not difficult to identify, the category itself appeared weak. The statements did not seem as suggestive of rules as was expected. Most statements, apart from those in the subcategories of "goal/objective/task" and must statements, were simply vague suggestions. This may imply the need for a new statement category entitled "suggestion."

The relationship statements, like the definition statements, presented a major portion of the responses. The subcategory of strict statements was easily defined and readily identified. The subcategory of loose statements was cumbersome and difficult to work with throughout the remaining stages of analysis. Apart from the continued demand to treat two sets of data, defined in this subcategory as present and future/past statements, the major problem focused on the difficulty of distinguishing between loose

relationships and description statements. While the subcategorization of present and future/past statements appeared essential, clearer definition and more efficient organization was needed. However, further definition would require additional data from respondents.

The category of description statements became a repository for statements impossible to be adequately categorized as definition, rule, and relationship statements.

Suggestion: Additional data from respondents might enable clearer definition of this category; however, it is suggested that a general category for housing statements such as these may be useful. As such, description statements, although clearly defined by the rules and guidelines, were general in nature.

Suggestion: Future research employing the current methodology could be more exact. The subcategories for rule and relationship statements could be modified by creating "research" and "suggestion" statement subcategories for rule statements. It is also suggested that the present and future/past statements be combined under the loose statement subcategory for relationship statements.

A concern with regard to the four statement categories results from the focus on grammatical structure. Statements were occasionally classified under a particular category because of improper use of punctuation in compound sentences. Except for the use of incorrect punctuation, these statements would have been classified in the unusable category. For example, the following statement, because it was improperly punctuated, was categorized as a definition:

> Formative evaluation is an on-going process that seeks information during the development of an educational entity (e.g., curriculum, instructional strategy or design of an instructional medium), whereas summative evaluation seeks information about the merits and short-comings of the completed entity.

While this statement was categorized as a definition statement, the use of correct punctuation (i.e., a semi-colon before "whereas") would have placed it in the unusable category as a compound sentence. Because the intent of this stage of analysis was not to reduce the amount of usable data but to classify it, the decision was made to place statements such as these in usable categories. As a result, the concern for losing potentially influential data was reduced. In these instances, the researcher exercised greater "judgmental" influence than was originally planned.

Third Stage of Analysis

Because the data were processed manually throughout the study and because of the large number of concept terms and concept term phrases, it was necessary to develop procedures for reducing the size of the collection while maintaining an accounting system for the original data. The resulting process of combination proved effective, but not efficient.

The five criteria employed in reducing the overall number of concept term and concept term phrase units, and the coding system developed to accompany these criteria, proved to be effective up to the development of concept term and concept term phrase combinations. The reduction of duplications, combination of singular and plural

forms, and combination of concept term phrases containing the same concept terms and same or similar adjectives, descriptors, and modifiers, produced the greatest impact upon the overall number of units. The attempt to combine concept terms and concept term phrases into CT, CTP, and CT/CTP combinations was complicated and time consuming and did not provide sufficient reduction in the number of units to warrant the effort expended. Further, developing CT, CTP, and CT/CTP combinations resulted in a continued concern for unaccounted data. Fortunately, the coding system eliminated this concern, but would have been much less complicated and easier to interpret had concept term and concept term phrase combinations not been developed.

The original intent of developing combinations was to adequately represent the foci of the data when the Frequency of Use List was compiled. For example, had learner and student not been combined, attention to the concept, learner(s)/student(s), would not have been reflected accurately by the number of appearances represented on the Frequency of Use List. The process of formulating combinations would appear necessary; however, revision of the current methodology would facilitate future data processing. A suggested adaptation is presented in the following discussion.

The frequency count of primary nouns provided an effective method for determining the strength of emphasis upon the original concepts. Moreover, the resulting Frequency of Use List accurately represented the number of appearances of concepts in statements

since these concepts were originally identified as concept terms and concept term phrases. However, due to the inefficiency created by developing CT, CTP, and CT/CTP combinations, revision of the methodology is recommended. Instead of developing these combinations, consideration should be given to changing the procedures for combining concept terms and concept term phrases and developing the Frequency of Use List.

Suggestion: Given the list of concept terms and concept term phrases identified in statements:

1. Eliminate exact duplications of concept terms and concept term phrases;
2. Combine singular and plural forms of concept terms and concept term phrases;
3. Combine concept term phrases containing the same concept term and same or similar adjectives, descriptors, and modifiers;
4. Reduce all concept term phrases to reduced phrases (single word nouns);
5. Combine concept terms and reduced phrases by eliminating exact duplications and combining singular and plural forms of the primary nouns; and
6. Employ a frequency count of concept terms, reduced phrases, and combined primary nouns to develop the Frequency of Use List.

The coding system developed for the present study would apply in the same manner to the suggested procedures listed above. The frequency count of concept terms, reduced phrases, and combined primary nouns would occur in the same manner as originally presented.

Assessment of the third stage of analysis directs additional attention to the notion of judgmental interpretation. The combination

of concept terms and concept term phrases, or, as in the recommended changes noted above, concept terms and reduced phrases (primary nouns), requires the researcher to make decisions about what can be combined. During this stage of analysis, the combination process was minimized to reduce the possibility of misinterpreting concepts. For example, while data, fact, and information were combined, cost and expense were not. It was the opinion of the researcher that the development of the combination data/fact/information was justified because of the use of the individual concepts within statements. Cost and expense were not combined because of the apparent differences of meaning presented within the corresponding statements. Similarly, education and training were combined, but method and methodology were not. Again, the concept terms were contained within statements which suggested sufficiently different meanings of the concepts so that combination of these terms was not attempted. It is suggested that the researcher's judgment is also influenced by his/her individual perspectives. As such, care must be exercised during the combining process to treat only those concept terms and concept term phrases.

Suggestion: In the future, consideration might be directed toward contacting respondents once concept terms and concept term phrases have been determined. The respondents could be requested to combine the CT's and CTP's according to their own perspectives. A tally of the resulting responses would lead to the reduced list of concept terms and concept term phrases.

Clearly, the development of CT, CTP, and CT/CTP combinations was the most difficult portion of the third stage of analysis. While producing 30 CT/CTP combinations, the overall reduction of concept terms and concept term phrases was minimal, i.e., 44 of 354 concept terms and 52 of 940 concept term phrases were combined.

Employing the five criteria for combininb concept terms and concept term phrases ultimately reduced the overall unit count from 1294 to 979, a reduction of 24%. This reduction, together with the reduction of concept term phrases and CT/CTP combinations to reduced phrases, simplified the frequency count and insured the development of the Frequency of Use List with accuracy and increased efficiency.

From an assessment of the third stage of analysis, the following strengths and weakness are summarized:

Strengths: The methodology permitted a reduction of almost one-quarter of the concept terms and concept term phrases.

The coding system developed to account for all concept terms and concept term phrases was successfully employed.

The development of primary nouns proved to be an effective means of determining the strength of emphasis upon original concepts.

Weakness: The methodology was inefficient and relatively ineffective regarding development of CT/CTP combinations.

Fourth Stage of Analysis

The methodology for this stage of analysis was not complex and afforded a relatively direct approach to formulating statement groups. As such, assessment of this stage focuses upon the selection of primary concept terms and primary reduced phrases and development of clusters.

An effective and objective approach to selection of primary concept terms and concept term phrases was provided by the criteria for a high frequency of appearances in statements and representation in the names of the professional association and its divisions. But the selection of primary concept terms and primary reduced phrases representing major interest in the profession was influenced by the researcher's training, knowledge, and interests. As such, persons with different educational and professional backgrounds might select different or additional primary concept terms and primary reduced phrases for analysis. Similarly, the development of clusters was influenced by these same factors. A different perspective on the interpretation of concept terms and concept term phrases would probably modify the composition and foci of the clusters formed.

From an assessment of the fourth stage of analysis, the following strength and weakness is summarized:

Strength: The methodology permitted an objective approach to the section of concepts contained in the Frequency of Use List.

Weakness: The need for judgmental selection of primary concept terms and primary reduced phrases in identifying major professional interests affects the ability to replicate the composition of clusters formed in future studies.

Fifth Stage of Analysis

Although no significant trends were revealed, the process developed to determine the existing trends among statements and placement of concepts within statements was extensive. Concentration on the categories of statements and subject placement within statements will support the definition of trends as will a review of the placement of individual PCT's and PRP's. As a result, only minor revision is suggested.

Suggestion: The review of complement placement of PCT's and PRP's was not productive because of the random emphasis on PCT's and PRP's contained in the complements of statements. Because of this random emphasis, it would be most difficult to determine trends by reviewing complement placement. To this end, it is suggested that future researchers not apply this review.

The final step in the analysis of data focused upon the evaluation of statement groups and the attempt to identify tentative theories. The methodology for this analysis required that each statement group contain an identifiable focus. Meeting this requirement was essential for completion of the statement group analysis. Establishing minimum criteria insured that statement groups contain sufficient substance; however, these criteria ultimately precluded identification of tentative theories from the data collected.

Suggestion: Future researchers might request that respondents provide statements attending to these criteria in an effort to define tentative theories or the foci of potential theories more clearly.

One factor affecting the evaluation of statement groups was the insufficiency of data provided within them.

Suggestion: While this study did not provide for further analysis of data, it is suggested that additional treatment of the statement groups be incorporated into the procedures. This treatment would allow that statement groups be combined according to compatibility of events.

A possible further treatment of statement groups is characterized below.

The statement group for the primary reduced phrase learning, developed from the cluster area related to learner characteristics, contained foci directed toward learning styles and instruction. This statement group could be combined with a statement group for instruction. This second statement group was developed from a cluster area related to learning with foci identified to include learner traits. Additional statement groups could be included which appear compatible with those identified, e.g., statement groups for learner(s)/student(s). This process would increase the amount of data and could potentially redefine the foci. The combined statement groups could then be evaluated, using the researcher's adaption of Bern's (1968) criteria.

From an assessment of the fifth stage of analysis, the following strengths and weaknesses are summarized:

Strengths: The methodology did reveal data of relevance to the profession even though no tentative theories were identified. It is useful in defining the field of educational communications and technology more clearly.

Future research might use additional data collected from a different population which could result in redefined emphases and differing collections of statement groups. The methodology, however, would remain applicable.

Weaknesses: In future studies, the requirement for judgmental interpretation by the researcher could alter the findings presented in this study.

The methodology did not permit a sufficient collection of data within statement groups to satisfy the criteria for tentative theory identification.

Questionnaire

The questionnaire designed for this study was intended to collect data representing conceptual thought among professionals in the field. In this respect it proved successful. However, the problems encountered during the five stages of analysis would suggest specific revisions:

1. Eliminate the requirement for producing a list of concept terms and replace this requirement with examples from the Frequency of Use List developed during this study. Additional foci might be suggested using the general cluster areas identified and the foci of the statement groups.

2. Provide definitions and examples of concept terms and concept term phrases as they were developed in this study. Emphasize their grammatical structure. Encourage respondents to restrict the number of adjectives, descriptors, and modifiers of concept terms where possible to reduce the possibility of misinterpretation of meaning.

3. Clearly emphasize the necessity for providing grammatically accurate sentences, and provide examples.

4. Provide the minimum criteria required for identification of tentative theories and supply an adequate explanation of each.

Conclusions

It is emphasized that the conclusions presented below are developed from data provided by only one component of the professional population and influenced by the researcher's perceptions as they affected the methodology. Furthermore, these conclusions are drawn from the substantive aspects of the data and not from the methodology. Methodological summaries and observations are presented in previous discussions.

> Conclusion: There is a general lack of agreement extant in the verbalization of conceptual thought among professionals in the field of educational communications and technology.

This conclusion is supported as a result of the identification of an immense volume and variety of concepts represented by concept terms and concept term phrases. Further, the absence of trends among statements containing primary concept terms and primary reduced phrases reinforces the conclusion by suggesting that the profession has yet to reach closure on the use of the language which represents its knowledge. This lack of agreement reflects the complexity of the language and reinforces the concern for the inconsistency of language usage.

> Conclusion: There is an observable effort to define the profession and to refine and clearly specify the concepts related to it.

This conclusion is supported by the findings revealing over twice as many concept term phrases as concept terms were identified. If the profession can be labelled justifiably as a developing field, then the number of concept term phrases reflects an effort to define

its knowledge. This premise is supported by the findings which revealed that almost one-third of the statements were categorized as definition statements, the largest category identified.

Symptomatic of the profession's development is the number of relationship statements categorized. The second largest category contained relationship statements. As such, these statements would suggest an attempt to affiliate concepts with those which are already defined.

It would appear that a parallel exists between the assessment criteria for tentative theories and the definition and relationship statements. The explanation criterion and the definition statements suggest a focus on clarifying the language. The commonality criterion and the relationship statements suggest a focus on interpreting the language. These observations support the notion that the language reflecting the knowledge of the profession is in the process of being defined and interpreted.

Conclusion: The field of educational communications and technology contains identifiable foci which serve as areas of concentration for the professional in the field.

This conclusion is supported by the findings which reveal that the concept terms learning and instruction and the concept term phrase development (instructional) were identified with greater frequency than all other concepts. The development of the Frequency of Use List supported these foci and expanded them to include process(s), system(s), theory(s), technology(s), concept(s), and learner(s)/student(s). Throughout the remaining stages of analysis, learning received the greatest attention.

The definition of cluster areas resulted in further emphasis upon the concepts related to learning, the learner, instruction, instructional development, and media/technology.

To summarize, the findings resulted in the identification of three major conclusions. The first conclusion reflects a general lack of agreement on the verbalization of conceptual thought. The profession is faced with the complexisty of its language and the need to define its knowledge. The second conclusion posits that the profession is involved with an effort to resolve this lack of agreement through definition of itself and clarification and refinement of its concepts. The third conclusion suggests that selected concepts within the knowledge base have been identified as foci. The research findings and conclusions suggest that while the profession retains its developmental status in its effort to define the knowledge base, it is able to provide a focus for major concepts within the knowledge base. And while tentative theory was not identified in this study, the findings do suggest possible foci for future theories.

Recommendations and Implications for Future Research

The presentation of recommendations and implications attends to two distinct concerns affecting future research in theory identification. The first concern focuses upon the quality and utility of the research design and methodology. The second concern is directed toward the conduct of future studies employing the design and methodology.

The Design and Methodology

The development and subsequent employment of the methodology was originally set forth as a primary purpose for the study. As a result of applying the methodology in the five-stage analysis of data and assessing its viability, a number of suggestions have been proposed in previous discussion in this chapter. While the majority of these suggestions will not alter substantially the basic design, two suggestions are presented below as recommendations to improve the quality of the methodology.

Recommendation: That the third stage of analysis be revised to eliminate the need for developing concept term/concept term phrase combinations.

As noted previously, the time and effort expended in developing CT/CTP combinations was not justified by the resulting combinations. They were relatively few in number and did not reduce sufficiently the number of concept term and concept term units. Incorporating the suggested revisions into this stage of analysis would increase greatly the accountability to the data and decrease substantially the time necessary to develop the Frequency of Use List.

Recommendation: That the fifth stage of analysis be further developed in order to combine statement groups.

The researcher posits that a primary disadvantage to identifying tentative theory in this study was the absence of sufficient data within individual statement groups. As a result, it was not possible for any single group to meet the minimum criteria

for tentative theory. Increasing the size of the statement group would increase the potential for fulfilling the required standards.

There are additional considerations which deserve attention at this point and which relate directly to the research design and methodology.

1. The design and methodology for this study incorporated a questionnaire to collect the raw data.

It is not unreasonable to consider that a future study of this nature obtain the raw data in a different manner. The use of a questionnaire for data collection purposes is only one of many alternatives; however, a variety of formats are plausible to which the methodology can be applied. Future research might give consideration to employing transcripts from discussions among a panel of experts or from in-depth interviews. A review of the literature to identify statements could also be used.

2. The Frequency of Use List served as a mechanism for determining those concepts receiving major attention by frequency of use by respondents.

It is conceivable that the major attention could be determined by means other than frequency. In this case, major concepts would be identified using additional or alternative methods.

3. Manipulation and analysis of data was conducted manually.

Due to the volume of data accumulated and the complexity of the data analysis, mechanical processing of information should be considered. Computer analyses of specifically coded data would help

to alleviate the concern for losing data as well as decreasing the amount of time and effort spent in analyzing the data.

Application of the Research Design and Methodology

With regard to employing the methodology in future studies of this nature, it is important to consider the limitations inherent in the conduct of the present study. In so doing, recommendations resulting from this consideration and the resulting implications are observed. These are presented below.

Recommendation: That the methodology for this study be applied to data from other segments of the professional population.

While the findings of the present study may apply to the profession as a whole, there exists the need to test and validate this question. In doing so, future findings could suggest reinforcement of current results, additional concerns, and/or that the population for this study be clearly unique in its perceptions of concepts central to the profession. In any case, alternative populations should be considered.

Respondents could be classified by divisions within the professional association, across divisions, within professional areas of employment such as public schools, higher education, and business and industry, or across these areas of employment. Samples could also be defined by age or years in the field. Future research in the area would afford the opportunity for a comparative analysis of findings among audiences. The ability to analyze and compare findings among different populations would provide a more succinct

definition of the problems and identification of component areas within the knowledge base.

An alternative to defining various audience samples would be to limit the conduct of the research. In this instance, the methodology would be employed only for a limited number of stages. For example, the first three stages might be used to determine the initial focus on component areas receiving major attention. These stages would also assist in revealing the problems extant in the use of the language. Addition of the fourth stage of analysis would aid in supporting the findings of the first three stages.

Recommendation: That the methodology be applied to an area of education not contained within the field of educational communications and technology.

The nature of education and its attendant processes places it within the parameter of the social sciences. As such, there exist a number of fields which parallel the status of educational communications and technology, in that they are in the developmental stages. Applying the methodology of this study to other educational fields would encourage both the search for theory and the organization of knowledge bases. Furthermore, it would serve to reinforce the utility and/or define the limitations of a methodology such as this to areas outside the profession.

Observations

The conduct of this study resulted in two personal observations which have influenced the researcher's perspectives on the field of educational communications and technology.

The first observation results from the major foci identified in the findings of the study. These findings suggest a hierarchical structure guided by the foci and interests of the profession (see Figure 5). While the components of this structure can be manipulated to present different patterns of relationships, the focus is upon the interrelatedness of the concepts represented in the structure.

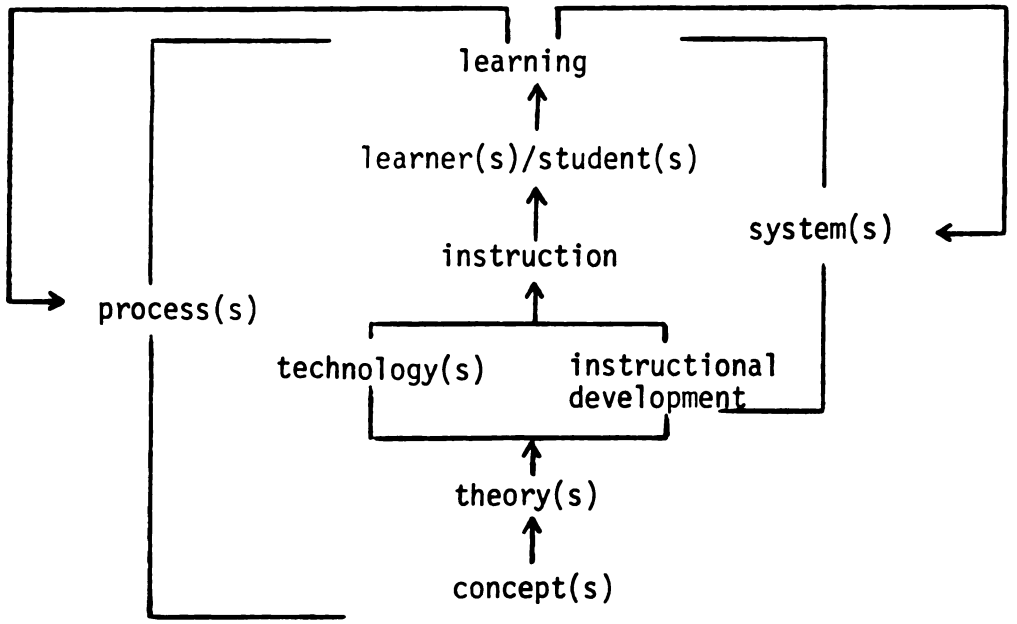


Figure 5: Hierarchical Structure for Major Foci.

The second observation supports the development of a model which, from the researcher's point of view, provides a greater understanding of the relationships which exist among research, theory, practice, and knowledge (see Figure 6).

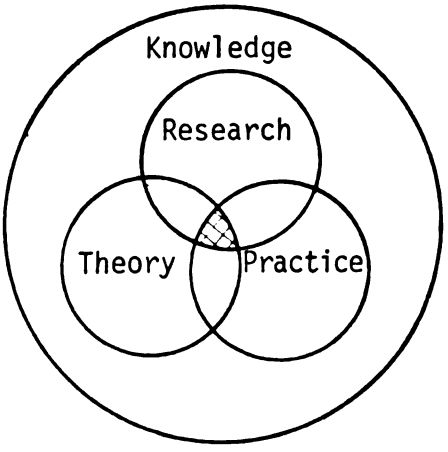


Figure 6: The Relationship Between Knowledge, Research, Theory, and Practice

In these relationships, a reasonable goal lies at the center of the circles. The ideal relationship would be the expansion of the center to the boundaries of knowledge.

In this diagram, knowledge is viewed as the base for all the activities which take place within the profession. As such, research is conducted with the support of current knowledge, but with the hope of creating additional knowledge. Theory is developed by arranging the knowledge base in such a way that generalizations and predictions can be proposed. Activities of the practicing professional in the field utilize the knowledge and affect the activities focused on research and theory development. The center of the circles reflects that the goal would be for research, theory development, and practice to affect each other, based upon the supporting knowledge base. The ideal would be for research, theory and practice to expand their

boundaries to the edge of knowledge at which time an expansion of the knowledge base would occur.

A study of this nature affords the opportunity for a professional in the field to gain an increased understanding of the origins of knowledge supporting the profession. In addition, one's perspective on current conceptual thinking among members of the profession is broadened. As a result of conducting this research, the problems faced by professionals in developing a field with its own unique character are understood, with an increased tolerance for ambiguity and a greater sense of achievement. This understanding now serves to temper the criticism surrounding the absence of sound theory and focuses attention toward solving the problems inherent in theory development in a social scientific profession.

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APPENDICES

APPENDIX A

THEORY IDENTIFICATION PROJECT QUESTIONNAIRE

THEORY IDENTIFICATION PROJECT

The proceeding questionnaire has been designed for members of the Research and Theory Division of the Association for Educational Communications & Technology

TURN TO PAGE 1

PART A. Demographic Data

1. To what AECT Division(s) do you belong? (Check correct category or categories.)

_____ Research & Theory	_____ Media Design & Production
_____ Instructional Development	_____ International
_____ Telecommunications	_____ Industrial Training & Education
_____ Information Systems	_____ Urban Educational Media
	_____ Educational Media Management

2. What academic degree(s) have you obtained?

DEGREE	YEAR OBTAINED	MAJOR FIELD OF STUDY	NAME OF INSTITUTION
_____ BA/BS/AB	_____	_____	_____
_____ MA/MS/MLS	_____	_____	_____
_____ Ed.S.	_____	_____	_____
_____ Ed.D./Ph.D.	_____	_____	_____
_____ Other (Specify)	_____	_____	_____

3. What is your primary area(s) of responsibility?

_____ Teaching	_____ Instructional Design/Development
_____ Administration	_____ Materials Production
_____ Research	_____ Student
	_____ Other _____ Specify

4. What is your principal employing agency?

_____ University	_____ Military
_____ Community/Junior College	_____ Government Agency
_____ Vocational/Technical Institution	_____ Business/Industry
_____ Public Schools (K-12)	_____ Other _____ Specify

5. What is your current title and/or academic rank?

TITLE/ACADEMIC RANK _____

TURN TO PAGE 2

6. How many years have you been professionally employed in the field of educational communications and technology?

_____ 0 - 5
_____ 6 - 10
_____ 11 - 15
_____ 16 - 20
_____ 21 - 25
_____ 25+

7. Age:

_____ 21 - 30
_____ 31 - 40
_____ 41 - 50
_____ 51 - 60
_____ 60+

8. Sex:

_____ Female
_____ Male

PART B. Concept Terms and Relational Statements

The remainder of this survey is concerned with gathering data to assist in the identification of tentative theories supporting the field of educational communications and technology. The following information is provided to facilitate your response:

INTRODUCTION

The field of educational communications and technology uses the knowledge of other disciplines, as well as generating its own, to support its intellectual growth and development and its practice. Literature and research from areas such as psychology, sociology, engineering, management and communications are influential in training professionals and supporting professional activity.

To clearly understand the extent and degree of sophistication of this interdisciplinary body of knowledge requires, in part, that key concepts and relationships among these concepts be identified. It is from these concepts and their relationships that theories can emerge. And, ultimately, it is organized theories that undergird a body of knowledge.

PURPOSE

The purpose of PART B of this questionnaire is to identify major concepts and their relationships which support professional activity in the field today.

DEFINITIONS

The following definitions are provided to assist you in responding:

1. CONCEPT: A statement(s) naming a phenomenon or event and a description of that phenomenon or event. (For purposes of this questionnaire, concept term, or the naming of the phenomenon or event, will be used.)

2. RELATIONAL STATEMENT: An explanation of the relationship which exists among two or more concepts.

TURN TO PAGE 3

DIRECTIONS

1. In the space below entitled CONCEPT TERMS, list those concept terms which you believe represent major ideas within the field as well as those which you use to support your work as a professional.

   EXAMPLES:
   * Behavior Modification
   * Diffusion
   * General Systems
   * Instructional Development
   * Learning Environment
   * Group Interaction
   * Contingency Management
   * Mastery Learning

   (These examples are provided to stimulate your thinking about major concepts in the field. They do not represent an exhaustive list, nor are they necessarily valid. If appropriate for your response, however, they may be repeated under CONCEPT TERMS below.)

2. Using the concept terms you will list below, indicate on the following pages under RELATIONAL STATEMENTS those major relationships you see among the concept terms. These statements need not necessarily correspond directly to each concept term listed, rather concept terms should be used to generate your thinking about major relationships which you believe exist in the field.

   EXAMPLES are provided on PAGE 4.

3. For each relational statement you present, note, if possible, the person(s) most frequently or commonly associated with it and the title or reference for the statement. (Do not hesitate to indicate a statement for which the author or citation is not known.)

4. Concept terms and relational statements from other disciplines, as well as from the field, are appropriate for your responses.

5. Use additional pages as required.

CONCEPT TERMS: List below those concept terms which you consider of major importance to you and to the field.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(Use additional space as required)

TURN TO PAGE 4

RELATIONAL STATEMENTS: Using the concept terms from the examples on PAGE 3, the following relational statements are illustrative of relationships:

EXAMPLE #1

RELATIONAL STATEMENT *The diffusion of an innovation can be considered in terms of an individual's levels of decision-making: awareness, interest, evaluation, trial and adoption/rejection of the innovation.*

AUTHOR *Everett Rogers* TITLE/REFERENCE *Diffusion of Innovations*

* * * * * * * * * * * * * * * * *

EXAMPLE #2

RELATIONAL STATEMENT *The use of the systems approach is an appropriate means of examining and understanding the complex educational social environment.*

AUTHOR *vonBertalanffy; Banathy* TITLE/REFERENCE *General Systems Theory*

* * * * * * * * * * * * * * * * *

In the space provided below and on PAGE 5 & 6, list those relational statements which you feel represent major relationships among concepts in the field. The list of concept terms you developed on PAGE 3 should be used as a guide, but should not necessarily restrict your response. (These relational statements may prompt you to add to your original list.)

RELATIONAL STATEMENT

AUTHOR TITLE/REFERENCE

* * * * * * * * * * * * * * * * *

CONTINUE ON PAGE 5

RELATIONAL STATEMENT _____

_____

_____

_____

_____

AUTHOR _____ TITLE/REFERENCE _____

* * * * * * * * * * * * * * * *

RELATIONAL STATEMENT _____

_____

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AUTHOR _____ TITLE/REFERENCE _____

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RELATIONAL STATEMENT _____

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AUTHOR _____ TITLE/REFERENCE _____

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RELATIONAL STATEMENT _____

_____

_____

_____

_____

AUTHOR _____ TITLE/REFERENCE _____

* * * * * * * * * * * * * * * *

CONTINUE ON PAGE 6

RELATIONAL STATEMENT _____

_____

_____

_____

_____

AUTHOR _____ TITLE/REFERENCE _____

* * * * * * * * * * * * * * * *

RELATIONAL STATEMENT _____

_____

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_____

AUTHOR _____ TITLE/REFERENCE _____

* * * * * * * * * * * * * * * *

RELATIONAL STATEMENT _____

_____

_____

_____

_____

AUTHOR _____ TITLE/REFERENCE _____

* * * * * * * * * * * * * * * *

(Use additional pages as required)

If you are interested in receiving a copy of the results of this study, indicate by checking the box. ☐

Thank you very much for participating in this study. Your time and assistance is greatly appreciated.

Laurel Dickerson

Laurel Dickerson
Principal Investigator

APPENDIX B

LETTERS INCLUDED IN QUESTIONNAIRE DISTRIBUTIONS

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN 48823

INSTRUCTIONAL MEDIA CENTER

October 3, 1975

Dear Colleague:

Because you are professionally interested in research and theory, we believe you will agree that Ms. Dickerson's doctoral study has high potential for helping determine the knowledge base undergirding our field of educational communications and technology.

We hope you will take time to respond thoughtfully to her request for your assistance. As you will note from the enclosed material, she is attempting to identify tentative theories in the field of educational communications and technology. We know you are especially well qualified to make a significant contribution to this study.

Thank you very much for your assistance. Please let us know when we can serve you.

Cordially,

Kent L. Gustafson
Dissertation Sponsor

Paul W. F. Witt
Member of Dissertation
Committee

sf

October 3, 1975

I am writing to request your assistance in a research project which I believe attends to a current need in our field. Specifically, this project focuses upon identifying theories contributing to the intellectual development and practice in educational communications and technology.

As a member of the Research and Theory Division of the Association for Educational Communications and Technology, you can make a significant contribution to this study. The enclosed questionnaire is designed to collect data on key concepts and relationships among these concepts. The data will be used in an attempt to identify tentative theories in the field of educational communications and technology.

Your participation is invited and greatly appreciated. Please complete the questionnaire and return it in the self-addressed, stamped envelope by October 13, 1975.

If you are interested in receiving the results of this study, please so indicate on the final page of the completed questionnaire.

Thank you very much for your time and assistance.

Sincerely,

Laurel Dickerson
Principal Investigator

Enclosures
1. Questionnaire
2. Self-addressed, stamped envelope

P. O. Box 448
East Lansing, Michigan
48823

Harold E. Hill, President
Howard B. Hitchens, Executive Director

Association for Educational Communications & Technology

1201 Sixteenth Street, N.W., Washington, D.C.20036 • (202) 833-4180

October, 1975

Dear Colleague,

As you are aware, AECT is continually trying to further define and structure the field of instructional technology. As a member of the AECT Research and Theory Division, your professional interest indicates that you would be especially well qualified to assist in a research project attempting to identify tentative theories in our field.

The enclosed questionnaire is designed to gather data for the formulations of these tentative theories. I urge that you take the time to complete this instrument and I am confident that your input will prove most valuable. Ms. Laurel Dickerson, director of the study, has promised to work with the Association in relating the findings to Association program. Please complete the questionnaire and return it as soon as possible to Ms. Dickerson.

Thank you very much for your cooperation. On behalf of AECT, I remain,

Gratefully yours,

Harold Hill

Harold Hill, President

Enclosure

October 20, 1975

This is to follow up a recent request for your assistance. For whatever reason, including the lure of a beautiful Indian summer, I have not yet received a response to the questionnaire sent to you on October 3.

It is because of your professional interest in research and theory that your assistance in identifying key concepts and their relationships in our field is requested. The need for an organized body of theory has been well documented by professionals in our field, but, to date, little attempt has been made to identify what tentative theories may exist. With your cooperation, an attempt is currently being made to attend to that need.

I invite your participation in this research project and am most grateful for your assistance. Enclosed is an additional copy of the questionnaire. Please complete and return it in the self-addressed, stamped envelope by November 1, 1975.

If you are interested in the results of this study, please so indicate on the final page of the competed questionnaire.

Thank you very much for your time and assistance.

Sincerely,

Laurel Dickerson

Laurel Dickerson
Principal Investigator

Enclosures
1 Questionnaire
2 Self-addressed, stamped envelope

P. O. Box 448
East Lansing, MI
48823

APPENDIX C

RULES AND GUIDELINES FOR IDENTIFYING CONCEPT TERMS AND CONCEPT TERM PHRASES

APPENDIX C

RULES AND GUIDELINES FOR IDENTIFYING CONCEPT TERMS AND CONCEPT TERM PHRASES

RULES

A. General

1. Concept terms and concept term phrases are identified from all data provided in the "Relational Statements" section of the questionnaire.

2. In identifying concept terms and concept term phrases, no judgment is made regarding the validity of the relational statements.

B. Specific

1. All concept terms (CT) are common nouns.

2. Concept term phrases (CTP) contain a concept term and modifiers, descriptors, and/or adjectives.

3. Proper names, proper nouns, geographic locations, titles, and references are not CT's nor are they included in CTP's.

   3.1 Slang terminologies are not CT's or part of CTP's.

   3.2 Quotes and quotations are not CT's or part of CTP's.

4. Possessive modifiers, articles, and demonstrative adjectives are not CT's nor are they included in CTP's.

   4.1 Possessive modifiers and demonstrative adjectives preceding prepositional phrases and referring to previously identified CT's are restated as the original CT's.

5. Adjectives denoting quantity, quality, valence, degree, and time are not part of CTP's.

6. Prepositional phrases and other phrases used to delimit time or an event are not CT's nor are they included in CTP's.

7. Nouns not in prepositional phrases are CT's.

   7.1 Nouns in prepositional phrases are CT's when the prepositional phrases are not preceded by a noun or another prepositional phrase.

8. Adjectives modifying CT's are part of CTP's.

9. When a prepositional phrase is preceded by a CT, the noun in the prepositional phrase becomes part of the CTP modifying the noun preceding the prepositional phrase.

   9.1 Nouns in prepositional phrases preceded by other prepositional phrases are descriptors of CT's and are part of the CTP.

10. Two or more adjectives not separated by a conjunction and modifying a noun are listed together in CTP's.

11. Gerunds cannot be CT's, but may be part of CTP's when they modify the CT's.

   11.1 Gerunds used as objects of prepositional phrases are not included in the CTP unless they modify the CT.

   11.2 A dictionary should be used when a question arises as to whether or not a gerund is a noun.

      EXAMPLES: understanding is referred to in the dictionary as a noun.

      testing is not referred to in the dictionary as a noun.

      11.2.1 All rules previously noted apply to the nouns.

12. Examples, phrases within parentheses, and numbered or listed sentences and/or those sentences following a colon can be used in the determination of CT's and CTP's.

13. Pronouns or possessive modifiers are translated to original CT's or CTP's when possible.

   13.1 Pronouns preceding prepositional phrases are restated as original CT's and CTP's when possible.

14. Abbreviated words should be spelled out completely and may be used as CT's and CTP's.

   14.1 Questions arising with regard to exact meanings should be referred to original authors of Relational Statements for clarification.

GUIDELINES	EXAMPLES
1. Delete all proper nouns, geographic locations, titles and references, and slang terms and phrases.	~~Travers'~~ Man's ~~Information~~ Systems is an attempt to . . .
2. Delete all articles (a, an, the), demonstrative adjectives (e.g., this, that, these, those), and possessive modifiers (e.g., my, our, your, its, their).	~~The~~ design of instruction in ~~our~~ field is ~~an~~ important part of ~~this~~ area of instruction.
3. Delete all modifiers denoting degree, valence, time, quantity, and quality.	~~The current~~ educational system implies ~~a general~~ use of ~~valuable~~ techniques in ~~today's~~ literature.
4. Delete all phrases serving as situational or time delimitors (e.g., in fact, in this case, in any situation, to date, under these conditions).	~~At this time~~, there is ~~a~~ need to, ~~in fact~~, produce quality instruction
5. Label all nouns in the sentence.	~~The~~ evaluation techniques used in instructional design and development in the classroom need to be improved for increased effectiveness in learning.
6. Circle all prepositional phrases.	~~The~~ evaluation techniques used in instructional design and development in the classroom need to be improved for increased effectiveness in learning

7. List all nouns not in prepositional phrases.
   7.1 List all nouns in prepositional phrases NOT preceded by nouns or other prepositional phrases.

techniques

design

development

effectiveness

8. Modifiers of nouns are placed in parentheses after the nouns listed.

techniques (evaluation)
design (instructional)
development (instructional)
effectiveness

   8.1 Two or more modifiers describing the same noun are listed separately with the noun when the modifiers are separated by a conjunction.

Develop and design techniques are used in audio and visual materials

techniques (development)
techniques (design)
materials (audio)
materials (visual)

9. Nouns in prepositional phrases preceded by a noun or other prepositional phrase describe the preceding noun and are listed after the preceding noun and separated by a colon.

The evaluation techniques used in instructional design and development in the classroom need to be improved for increased effectiveness in learning

techniques (evaluation)
design (instructional): classroom
development (instructional): classroom
effectiveness: learning

9.1 Two or more nouns in prepositional phrases are listed separately with the noun they describe.

Techniques of design and development are included in the process of organization and management

techniques: design
techniques: development
process: organization
process: management

9.2 Modifiers of the noun in the prepositional phrase are listed after the noun in parentheses.

Techniques of instructional design and development are included in the process of educational organization and management.

techniques: design (instructional)
techniques: development (instructional)
process: organization (educational)
process: management (educational)

9.3 Two or more modifiers of nouns in prepositional phrases are listed separately with the noun and with the noun the prepositional phrase describes when the modifiers are separated by conjunctions.

Techniques of instructional and evaluational design and development are included in the process of educational and systems organization and management

techniques: design (instructional)
techniques: design (evaluational)
techniques: development (instructional)
techniques: development (evaluational)
process: organization (educational
process: organization (systems)
process: management (educational)
process: management (systems)

9.4 Subsequent nouns and modifiers in prepositional phrases follow a colon at the end of the preceding nouns and modifiers.

Techniques (in instructional design) (in the classroom). . .

techniques: design (instructional): classroom

10. Two or more modifiers not separated by conjunctions (modifier phrases) are listed together with the noun they modify.

Instructional development techniques can be applied to . . .

techniques (instructional development)

liberal arts education provides . . .

education (liberal arts)

Formative evaluation methods have been developed to . . .

methods (formative evaluation)

11. Delete all gerunds which have been labeled as nouns and would otherwise be concept terms.

~~The~~ process (of development) is useful (for ~~testing~~) (of evaluation schemes)

process: development
schemes (evaluation)

11.1 Gerunds which modify nouns are listed as part of the concept term phrase.

There is ~~a~~ need (for the testing) (of evaluation schemes)

need: testing: schemes (evaluation)

12. Treat examples, phrases within parentheses, and numbered sentences and/or those following a colon with guidelines 1-12.

~~The~~ development process (e.g., problem definition, (development of objectives,) and evaluation) focuses (upon ~~the~~ learner.)

12. (continued)

process (development)
definition (problem)
development: objectives
evaluation
learner

Technologists need to be aware that ~~total~~ environment is important (particularly in institutional settings).

technologists
enviornment
settings (institutional)

12.1 When appropriate, one prepositional phrase is replaced by another prepositional phrase.

Teacher evaluation of students, but not of teachers, is a necessary component . . .

evaluation (teacher): students
evaluation (teacher): teachers
component . . .

13. Restate all pronouns and possessive modifiers as original concept terms where possible. Apply guidelines 1-12 as applicable.

Educators are opinion leaders but ~~the~~ concept needs ~~further~~ refinement for ~~them.~~ educators

Technology has ~~many~~ meanings. ~~It~~ Technology should be well defined when used.

Learning systems are ~~complex~~ mechanisms and ~~we~~ should take advantage of ~~them~~ learning systems in instructional design procedures.

14. Spell out completely any abbreviated words before listing them as concept terms or parts of concept term phrases.

instructional development
~~ID~~ is a term with . . .

educational technology
~~ET~~ is a concept which . . .

SUMMARY EXAMPLE (Numbers correspond to the Guidelines)

~~In this case, the~~ planning and evaluation techniques in instructional design and development for classroom situations need to be improved for ~~increased~~ effectiveness in formal and informal learning.

7. techniques

7.1 effectiveness

8. techniques (planning)

8.1 techniques (evaluation)

9. techniques (planning): design
techniques (evaluation): design
effectiveness: learning

9.1 techniques (planning): development
techniques (evaluation): development

9.2 techniques (planning): design (instructional)
techniques (evaluation): design (instructional)
techniques (planning): development (instructional)
techniques (evaluation): development (instructional)
effectiveness: learning (formal)

9.3 effectiveness: learning (informal)

9.4 techniques (planning): design (instructional): situations (classroom)
techniques (evaluation): design (instructional): situations (classroom)
techniques (planning): development (instructional): situations (classroom)
techniques (evaluation): development (instructional): situations (classroom
effectiveness: learning (formal)
effectiveness: learning (informal)

APPENDIX D

RULES AND GUIDELINES FOR DETERMINING CATEGORIES OF STATEMENTS

APPENDIX D

RULES AND GUIDELINES FOR DETERMINING CATEGORIES OF STATEMENTS

RULES

General

1. Two or more sentences contained in a statement are separated and categorized separately. These sentences then become separate statements.

2. All statements, to be considered useable for analysis in identifying tentative theories, must contain two or more concept terms and/or concept term phrases.

3. All statements, to be considered useable for analysis in identifying tentative theories, must be functional, though not necessarily grammatically correct, sentences.

Specific

1. Statements are categorized into five general categories:

   Definitions
   Rules
   Relationships
   Descriptions
   Unuseables

2. The category of Definitions is considered a useable category and contains the following sub-categories:

   Equal
   Congruent/Similar
   Component

3. The category of Rules is considered a useable category and contains the following sub-categories:

   Must
   Goal/Objective/Task
   Should/Need/Ought
   Might/May/Could

4. The category of Relationships is considered a useable category and includes the following sub-categories:

   Strict relationships
   Loose relationships
   a. Present
   b. Past/Future

5. The category of Descriptions is considered a useable category and has no sub-categories.

6. The category of Unuseables is not considered a useable category and includes the following sub-categories:

   Critiques
   Reviews
   Uncodeable
   a. Compound
   b. Unqualified: does not contain two or more concept terms and/or concept term phrases; is not a functional sentence.

GUIDELINES

DIAGRAMMING: To determine categories of relational statements, the following standard procedures are to be employed:

1. Determine all concept terms and concept term phrases for each relational statement.

1. Design and evaluation techniques are used in the process of instructional development

2. Letter each listed concept term/ concept term phrase sequentially.

2. A. techniques (design)
   B. techniques (evaluation)
   C. process: development (instructional)

3. Determine the general subject-verb-complement components of the sentence and underline the verb/ verb phrase.

3. Design and evaluation techniques are used in the process of instructional development.

4. List verb/berb phrases

4. are used in

5. Place all letters representing concept terms/concept term phrases in the subject to the left of the verb/verb phrase

5. A
   B
   are used in

6. Place all letters representing concept terms/concept term phrases in the complement to the right of the verb/verb phrase

6. [A] [B] are used in [C]

EXAMPLE: ~~The~~ ~~rapid~~ increase in the development of ~~new~~ technologies is creating ~~a~~ ~~concurrent~~ concern for ~~the~~ development of ~~new~~ methods of evaluation.

A increase: development: technologies
B concern: development: methods: evaluation

[A] is creating [B]

~~The~~ educational setting ~~today~~ employs ~~a~~ variety of teaching and evaluation techniques.

A setting (educational)
B variety: techniques (teaching)
C variety: techniques (evaluation)

[A] employs [B] [C]

EXAMPLE: Instructional development, which contains design and evaluation techniques, concerns faculty and student development.

A development (instructional)
B techniques (design)
C techniques (evaluation)
D development (faculty)
E development (student

CATEGORIZING: The categorization of statements will be developed into the following areas:

General Structure used below: SUBJECT-VERB-COMPLEMENT

where x = SUBJECT
y = COMPLEMENT

1.0 Definitions

1.1 Equal	x is (is not)	y
1.2 Congruent/Similar	x is (is not) congruent with	y
	x is (is not) similar to	y
	x is (is not) interpreted as	y
	x is (is not) characterized as	y
	x functions (does not function) as	y
	x implies (does not imply)	y
	x addresses (does not address)	y
	x refers (does not refer) to	y
	etc.	
1.3 Component	x is (is not) part of	y
	x includes (does not include)	y
	x is (is not) a function of	y
	x is (is not) an aspect of	y
	x incorporates (does not incorporate	y
	x is (is not) considered in terms of	y, y_1, y_2, etc.

2.0 Rules

2.1 Must	x must (must not) be	y

2.2 Goal/Objective/Task	The goal of	x	is (is not)		y
		x	is (is not) the goal of		y
	The objective of	x	is (is not)		y
		x	is (is not) the objective of		y
	The task of	x	is (is not)		y
		x	is (is not) the task of		y
2.3 Should/Need/Ought		x	should (should not) be		y
		x	needs (does not need) (to be)		y
		x	ought (ought not) to be		y
2.4 Might/May/Could		x	might (might not) be		y
		x	may (may not) be		y
		x	could (could not) be		y

3.0 Relationships

3.1.0 Strict relationships		x	is (is not) related to		y
		x	is (is not) dependent on		y
		x	increased (decreases)		y
		x	increases (decreases) with		y
	If	x	then (then not)		y
	Given	x	then (then not)		y
	When	x	then (then not)		y
	etc.				

3.2.0 Loose Relationships

3.2.1 Present

x contributes (does not contribute) to y
x provides (does not provide) y
x offers (does not offer) y
x reflects (does not reflect) y
x promotes (does not promote) y
x is (is not) concerned with y
x concerns (does not concern) y
etc.

3.2.2 Past/Future

x will (will not) be y
x awaits (does not await) y
x occurred (did not occur) when y

4.0 Description

x describes y
x is described by y

5.0 Unuseables

5.1.0 Critique

A personal opinion offered by the respondent; a critical statement.

5.2.0 Review

A review of an author's work or a citation of a work.

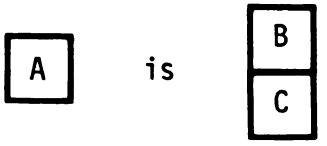
5.3.0 Uncodeables

5.3.1 Compound

A sentence containing two or more of the above categories; two statements within one containing more than one category, e.g., x defines y; x_1 is related to y_1.

5.3.2 Unqualified

Not functional sentences and/or only one concept term or concept term phrase used in the statement.

CATEGORIES	EXAMPLES
1.0 Definitions	(The first example represents the complete derivation of this category; the proceeding examples are those which have been categorized through the use of the derivation process.)
1.1 Equal	subject Instructional technology is ~~the~~ totality of ~~the~~ instructional complement process and related services A technology (instructional) B totality: process (instructional) C totality: services  Cognitive styles are learner traits which have potential for maximizing instructional outcomes when used in instructional development.
1.2 Congruent/Similar	Instructional design implies that man needs to improve the methods which we design, test and evaluate. Human information processing seems to be characterized by relatively autonomous functioning of cognitive information clusters. Man's perceptual system functions as an information system that requires a continuous input of new information.

1.3 Component	Systems design allows for the efficient planning, production and testing of instructional units.
	An understanding of communication models is a necessary aspect of media and technology.
	Evaluation models incorporate both formative and summative evaluations.
2.0 Rules	
2.1 Must	Determination of worthy goals must be defined within the perspective of appropriate publics.
	Those who produce and use media must understand the various types of creativity to know which type is being developed by each medium.
	In order to comprehend the effectiveness of instruction and learning, a mastery of learning theory is required.
2.2 Goal/Objective/Task	The goal of instruction is to maximize the efficiency with which all students achieve specified objectives.
2.3 Should/Need/Ought	Students should be evaluated against a set standard rather than in competition with one another.
	Message forms for instruction should fit the unique needs of learners and objectives.
	The urgent need is for information management systems based upon an expanded and redirected inquiry base.

2.3 (continued)	Before truly individualized instruction can become a reality, learning packages are needed which will provide for self-paced, rather than group-paced, instruction.
2.4 Might/May/Could	Specific thinking skills might be enhanced or strengthened through the application of specific training activities as suggested by the structure of the intellect and its operational work. Aptitude treatment interaction research may make possible predictive matching of student and treatment.
3.0 Relationships	
3.1.0 Strict	Meaningful learning assumes the learner can positively identify with the mode and method of instruction. The effectiveness of an instructional program is positively related to the appropriateness of practice. Full accounts of learning depend upon the largely inaccessible internal cognitive systems.
3.2.0 Loose	
3.2.1 Present	The understanding on human visual perceptual systems will contribute to research on human information processing systems. Knowledge on behavioral modification will provide basis for studies on pictorial and audio perception

3.2.1 (continued)

The emergence of new meanings in the learner reflects the completion of a meaningful learning process.

The message designer is concerned with the production of procedures and materials to be used in instruction.

3.2.2 Past/Future

A major breakthrough in the training of teachers occurred when teaching behavior was conceived to be a complex of skills that could be identified and practiced.

A new technology of attitude and motivational change will be developed in the future.

4.0 Descriptions

Proximal laws are now in process of development in related areas of scientific management, industrial engineering and educational evaluation.

Instructional development places all modes and media of instruction on equal footing.

Organizational behaviors and dynamics are generalizable among organizations.

5.0 Unuseable

5.1.0 Critique

At present, little is being done to coordinate findings in the field to deficiencies in reading aptitude.

It is about time for the educational agencies to become conscious of the term 'individual differences.'

Verbal primacy is a concept that is little appreciated by audiovisual people.

5.2.0 Review

Travers' Man's Information Systems attempts to gather scientific findings on human perception to aid the audio-visual materials producer design materials.

The open-system model as proposed by William Winn is the most comprehensive theory to date and will lead to a whole new track for research.

I have written a manuscript for a book that accomplishes this objective.

5.3.0 Uncodeable

5.3.1 Compound

All learning is individual, but the conditions of learning can be varied in terms of group size.

Most students can master what we have to teach them, and it's the task of instruction to find the means which will enable them to master the subject under consideration.

5.3.2 Unqualified

Application of research findings in instruction in determining mastery levels (not a functional sentence).

It may not be possible to locate matching organizers, and then dissonance will occur (not functional sentence).

Perception in communication cannot be taken for granted (only one concept term phrase).

The research technology must be greatly expanded (only one concept term phrase).

APPENDIX E

RULES AND GUIDELINES FOR COMBINING CONCEPT TERMS AND CONCEPT TERM PHRASES

APPENDIX E

RULES AND GUIDELINES FOR COMBINING CONCEPT TERMS AND CONCEPT TERM PHRASES

RULES

General

1. Concept terms and concept term phrases developed from the category of Unuseable Statements are to be disregarded.

2. Exact duplications of concept terms and concept term phrases are to be deleted.

Specific

1. Concept terms and concept term phrases which are differentiated only by singularity or plurality are combined.

2. Concept term phrases containing the same concept terms and descriptors are combined.

3. Concept terms and concept term phrases denoting the same and/or similar meaning are combined.

4. Generalizations of concept terms and concept term phrases are combined with the specific concept terms and concept term phrases, e.g., concept: learning is combined with learning.

GUIDELINES	EXAMPLES	
1. Delete all plural concept terms and concept term phrases which are duplicated in singular form and add "s" in parentheses following the singular term.	abilities ability	ability(s)
	abilities: learner ability: learner	ability(s): learner
2. Delete concept term phrases containing the same terms and descriptors and replace with a concept term separated from the descriptor with a line (-).	development: instruction development (instructional)	development - instruction
	ability(s): learner ability(s) (learner)	ability(s) - learner
	design: messages design (message)	design - message(s)
3. List all same/similar concept terms and concept term phrases and combine alphabetically separating each with a virgule (/).	professor teacher instructor personnel (instructional)	instructor/personnel (instructional) professor/teacher
	ability(s) - learner capability: learner	ability(s)/capability - learner
	instruction (individualized) instruction (personalized)	instruction (individualized/personalized)
	attainment: objectives achievement (academic)	CANNOT BE COMBINED
4. List all similar generalizations and combine with specific concept terms/concept term phrases. Separate with a virgule (/).	concept: learning concept (learning)	concept - learning
	learning	learning/concept - learning

APPENDIX F

GUIDELINES FOR COMBINING STATEMENTS

APPENDIX F

GUIDELINES FOR COMBINING STATEMENTS*

Developing a Frequency of Use List of Primary Concept Terms and Primary Reduced Phrases

1. List all concept terms and the first word in concept term phrases (called reduced phrases) which occur four or more times.

EXAMPLE

Before Listing	After Listing
learning	3
learning: material	
learning (visual)	learning
development (instructional)	4
development: materials	development
development (systems)	
development	

The list which is finally developed is called the Frequency of Use List of Primary Concept Terms and Primary Reduced Phrases (Frequency of Use List of PCT's and PRP's).

2. For each PCT and PRP occurring on the list, perform the following operations:

   a. Compile a set of all statements (excluding those which are in the Unuseable Category) which contain a selected PCT or PRP.

   b. Review each statement and note the category of statement in which it belongs and whether or not the PCT or PRP is in the subject (x) or the complement (y) of the sentence.

*No rules have been developed for these guidelines.

EXAMPLE

PCT/PRP: instruction

Statement: The complex of individual differences each learner contains will affect directly responses to given forms of messages used for instruction.

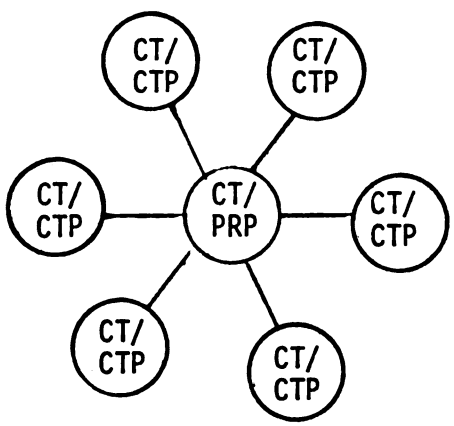
Category: Relationship, Strict

Position: Complement (y)

Diagramming to Form Cluster Areas

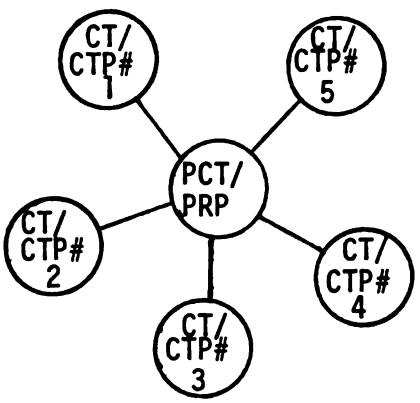
1. Construct a diagram of PCT/PRP - concept terms/concept term phrases. The PCT/PRP is placed in the center of the diagram and the concept terms (CT's)/concept term phrases (CTP's) surround the center.

EXAMPLE



2. When the same CT/CTP occurs two or more times in the set of statements reviewed, a notation is made on the line extending from the PCT/PRP to that CT/CTP in the statement.

EXAMPLE



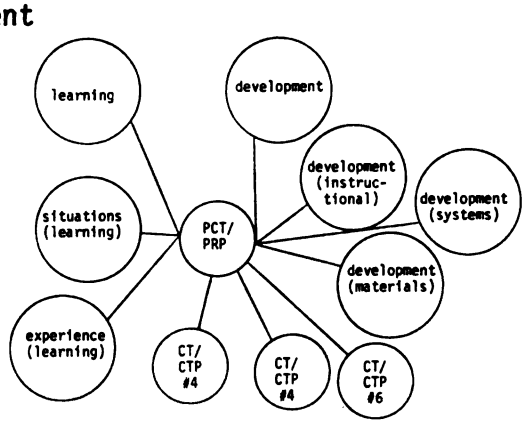
CT/CTP #1 has occurred once
CT/CTP #2 has occurred twice
CT/CTP #3 has occurred thrice, etc.

3. Group CT's and CTP's from the statements into general areas around the PCT/PRP.

EXAMPLE

CT/CTP: learning
situations: learning
experiences: (learning)

development (instructional)
development (systems)
development (materials)
development



4. Combine into sub-sets all statements which contain both the PCT/PRP and the clusters of CT/CTP's.

APPENDIX G

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

APPENDIX G

DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1: Respondents' AECT Division Affiliation by Number of Division Memberships

Number of Division Memberships	N	%
1*	23	40.4
2	20	35.0
3	6	10.5
4	6	10.5
5	2	3.5
Total	57	99.9**

*Division memberships only in the Research and Theory Division.

**Total not equal to 100.0% due to rounding.

Table 2: Respondents' AECT Division Affiliation by Division Name

Division Name	N*	%*
Research and Theory	57	100.0
Educational Media Management	4	7.0
Industrial Training and Education	2	3.5
Information Systems	2	3.5
Instructional Development	32	56.1
International	2	3.5
Media Design and Production	7	12.3
Telecommunications	9	15.8
Urban Educational Media	1	1.8
Total N: 57		

*Totals do not equal 57 or 100.0% for divisions other than Research and Theory because 34 members hold multiple memberships in 2 to 5 other divisions.

Table 3: Respondents' Highest Academic Degree Obtained

Highest Degree Obtained	N	%
BA/BS/AB	2	3.5
MA/MS/MLS/MEd	13	22.8
Ed.S.	1	1.8
Ed.D./Ph.D.	35	61.4
Other (ABD)	6	10.5
Total	57	100.0

Table 4: Respondents' Primary Areas of Professional Responsibility

Area of Responsibility	N*	%*
Administration	14	24.6
Instructional Design/Development	19	33.3
Materials Production	5	8.8
Research	18	31.6
Student	1	1.8
Teaching	40	70.2
Other	5	8.8
Total N: 57		

*Totals do not equal 57 or 100.0% because 34 respondents listed more than one primary area of professional responsibility.

Table 5: Respondents' Principle Employing Agency

Employing Agency	N	%
Business/Industry	4	7.0
Community/Junior College	2	3.5
Government	2	3.5
Military	1	1.8
Public Schools (K-12)	5	8.8
University	37	64.9
Vocational/Technical Institution	0	0.0
Other	6	10.5
Total	57	100.0

Table 6: Respondents' Years of Employment in the Field

Years of Employment	N	%
0 - 5	18	31.6
6 - 10	19	33.3
11 - 15	7	12.3
16 - 20	4	7.0
21 - 25	2	3.5
25 +	6	10.5
No Response	1	1.8
Total	57	100.0

Table 7: Respondents' Age

Age	N	%
21 - 30	10	17.5
31 - 40	19	33.3
41 - 50	13	22.8
51 - 60	10	17.5
60 +	4	7.0
No Response	1	1.8
Total	57	99.9*

*Total does not equal 100.0% due to rounding.

Table 8: Respondents' Sex

Sex	N	%
Female	7	12.3
Male	50	87.7
Total	57	100.0

APPENDIX H

RESPONDENTS' AREAS OF ACADEMIC TRAINING

APPENDIX H

RESPONDENTS' AREAS OF ACADEMIC TRAINING

Respondents reported the following areas as the focus of their academic training:

AREA	N (Respondents)	%
Curriculum	3	5.3
Curriculum		
Curriculum and Instruction		
Curriculum Development		
Educational Communications and Technology	31*	54.4
Audiovisual Communications		
Educational Communications		
Educational Media (3)		
Educational Media/Curriculum and Instruction		
Educational Technology (3)		
Educational Technology/Environmental Education		
Instructional Communications		
Instructional Design		
Instructional Development		
Instructional Media (2)		
Instructional Systems Technology (2)		
Instructional Technology (13)		
Media		
Education (Miscellaneous)	8	14.0
Education (2)		
Educational Psychology (2)		
Educational Psychology/Educational Administration		
Higher Education		
Industrial Education		
Math Education		

AREA	N (Respondents)	%
Miscellaneous	9	15.8
Food and Nutrition Industrial Management Mass Media Psychology Radio and Television Research Russian Area Studies Speech Speech Communications		
No Response	6	10.5
TOTAL	57	100.0

*Of the 31 respondents holding degrees in the area of educational communications and technology, 21, or 36.8% of the total number of respondents, had the doctoral degree in the area and 10, or 17.5% of the total number of respondents, had a Masters' degree in the area.

APPENDIX I

RESPONDENTS' ADMINISTRATIVE TITLES AND ACADEMIC RANKS

APPENDIX I

RESPONDENTS' ADMINISTRATIVE

TITLES AND ACADEMIC RANKS

Respondents reported the following administrative titles and academic ranks as their current professional positions:

AREA	N (Respondents)	%
Educational Communications and Technology	21	36.8
Administrative Titles	(8)	(14.0)
Assistant Director, Communications Media		
Assistant Superintendent, Instructional Services		
Associate Director, Project ADVANCE		
Coordinator, Science Program		
Coordinator, Visual Learning		
Director, Cable Television Project		
Director, Instructional Technology and Instructional Media Services		
Director, Resources and Communications		
Administrative Titles/Academic Ranks	(8)	(14.0)
Assistant Director, Learning Resources Center/Instructor		
Assistant to Director, Instructional Resources/Assistant Professor		
Chairperson, Media Department/ Associate Professor		
Coordinator, Instructional Development/ Assistant Professor		
Director, Audiovisual Department/ Associate Professor		
Director, Educational Media/ Associate Professor		
Director, Educational Resources/ Assistant Professor		
Director, Instructional Development/ Professor		

AREA	N (Respondents)	%
Academic Ranks	(4)	(7.0)
Acting Assistant Professor of Library Science Assistant Professor of Information Science Professor of Communications Professor of Educational Media and Information Science		
Other	(1)	(1.8)
Media Specialist		
Miscellaneous	36	63.2
Administrative Titles	(4)	(7.0)
Owner, Publishing Firm President, Business Firm President, Community College Vice President, Consulting Firm		
Administrative Titles/Academic Ranks	(2)	(3.5)
Area Coordinator/Professor of Educational Psychology Director, IIIT Program/Professor		
Academic Ranks	(22)	(38.6)
Assistant Professor (5) Associate Professor (4) Instructor (3) Instructor in Mathematics Professor Emeritus Professor of Education (6) Teaching Associate Teacher of Environmental Education		
Other	(8)	(14.0)
Associate Professor/Education Program Specialist Consultant (3) Educational Specialist (2) Graduate Assistant (2)		
TOTAL	57	100.0

APPENDIX J

CT'S AND CTP'S TREATED DURING THE COMBINATION PROCESS

APPENDIX J

CT'S AND CTP'S TREATED DURING THE COMBINATION PROCESS

CRITERION 1: Duplication of concept terms and concept term phrases.

The following list presents those CT's which were duplicated. (The numbers in parentheses represent the times duplicated.)

ability (1)
assumptions (1)
attitude (1)
attitudes (2)
awareness (1)
behavior (4)
channels (1)
classroom (1)
communication (4)
concept (5)
conditions (1)
decisions (1)
education (2)
efficiency (1)
environment (1)
evaluation(2)
feedback (3)
goals (1)
ideas (1)
information (2)
instruction (9)
instructor (1)
interest (1)
knowledge (2)
learner (6)
learners (1)
learning (26)
means (2)
media (7)
motivation (2)
need (5)
objectives (3)
perception (1)
pictures (1)
principles (1)
process (1)
processes (1)
research (2)
situation (2)
student (4)
supplantations (1)
system (1)
systems (1)
teacher (3)
technologists (1)
television (1)
time (2)
trial (1)
viewer (1)

The following list presents those CTP's which were duplicated. (The numbers in parentheses represent the times duplicated.)

accounts: learning (1)
adoption: innovation (1)
analysis (task) (2)
aspect: technology (1)
base (empirical) (1)
base (inquiry) (2)
basis: materials (instructional (1)
concept (leader) (1)
concept (opinion) (1)
decisions (design) (1)
decisions (managerial) (1)
design: instruction (1)
design (instructional) (3)
design(systems) (1)
development (instructional) (8)
diffusion: innovation (2)

education (affective) (1)
effectiveness: instruction (1)
environment (educational) (1)
environment (learning) (1)
environment (social) (1)
evaluation (formative) (3)
evaluation (program) (1)
evaluation (summative) (2)
feedback (negative) (1)
feedback (positive) (1)
languages (visual) (1)
laws (proximal) (1)
learning (mastery) (1)
literacy (visual) (4)
media: instruction (2)
packages (learning) (1)
rejection: innovation (1)
scores (reading) (1)
situation (learning) (2)
strategies (teaching) (2)
structure: intellect (1)
styles (cognitive) (1)
system (cognitive) (1)
system (management) (1)
systems (information) (1)
teacher (human) (1)
technology (educational) (3)
theory: instruction (1)
theory (learning) (2)
use: approach (systems) (1)

CRITERION 2: Combining singular and plural forms of concept terms and concept term phrases.

The following list presents those CT's which were combined because of singularity and plurality:

ability(s) (2)
aptitude(s)
attitude(s) (4)
behavior(s) (4)
communication(s) (4)
communicator(s)
concept(s) (5)
drive(s)
factor(s)
form(s)
goal(s) (1)
learner(s) (7)
material(s)
medium(s) (7)
picture(s) (1)
problem(s)
process(s) (2)
program(s)
supplantation(s) (1)
system(s) (2)
technology(s) (2)
term(s)
type(s)

The following list presents those CTP's which were combined because of singularity and plurality;

approach(s): learning
experience(s) (learning)
form(s) (message)
mode(s): instruction
process(s) (developmental)
response(s): message
technology(s): instruction
theory(s): instruction (1)
theory(s) (learning) (2)

CRITERION 3: Combining CTP's containing the same singular or plural concept term and same or similar form of adjective, descriptor, or modifier.

The following list presents those CTP's containing the same concept term and same or similar adjective, descriptor, or modifier:

evaluation - program(s) (1)
goal(s) - instruction(al)
learning - hierarchies(ical)
management - learning
medium(s) - instruction(al) (2)
needs - learner(s)
problem(s) - education(al)
technology(s) - instruction(al)
theory(s) - learning (2)

CRITERION 4: Combining concept terms and concept term phrases having the same or similar meanings.

The following list presents those CT's which were combined to form CT combinations:

ability(s) (2)/capability
data/fact/information (2)
function/purposes
goal(s) (1)/mission
human/man/person
instructor (1)/teacher (3)
involvement/participation
learner(s) (7)/student (4)
means (2)/methods
motion/movement
outcomes/output/products/results
phases/stages
possibilities/potentials
realism/reality

The following list presents those CTP's which were combined to form CTP combinations:

amount: data/volume: information
characteristics/traits (learner)
environment (educational (1)/ learning (1))
environment (1)/surround (social)
events (information-bearing/ instructional)
experience(s) (educational/ learning)
materials (instructional/ learning)
messages (audiovisual/ mediated)
method/mode(s): instruction

CRITERION 5: Combining concept terms and concept term phrases representing the same general areas of meaning.

The following list presents the CT/CTP combinations representing CT's, CTP's, and CT and CTP combinations representing general areas of meaning. (CT and CTP combinations produced by using criterion 4 are presented in capital letters.)

application/use (1): approach (systems)
aspect (1)/part: technology
education (2)/training
ENVIRONMENT (EDUCATIONAL (1)/LEARNING (1))/setting (instructional)
ENVIRONMENT (SOCIAL (1)/sociological)/SURROUND (SOCIAL)
EXPERIENCE(S) (LEARNING/EDUCATIONAL)/situation (learning) (2)
functions (education-learning)/purpose: learning
instruction (computer-assisted/computerized)
instruction (individualized/self-paced)
INSTRUCTOR (1)/manager: learning/TEACHER (3)/teacher (human) (1)
outcomes (instructional)/potential - learning

medium(s) (7) - instruction(al) (2)

blackboard
books
films
microfilm
picture(s) (1)
print
records
tapes
television

form(s) (media)
materials (recorded)
media (presentation)
medium (transmission)
MESSAGES (AUDIOVISUAL/MEDIATED)
player (record)
presentations (multi-media)
program (television)
projector (overhead)
self-instruction (mediated)
strips (film)
strips (sound)
systems (conveyance): forms (message)
system (television)
technology (disc)
technology (video)
unit (playback)

APPENDIX K

ABSTRACT OF THE CT AND CTP COMBINATION PROCESS

APPENDIX K

ABSTRACT OF THE CT AND CTP COMBINATION PROCESS

The following abstract outlines the process used to combine concept terms and concept term phrases and to form CT and CTP combinations. Following the list below, Primary Alphabetical List, each list of CT's and CTP's presented is an abstract of the results of employing the individual criteria for combination. The asterisk (*) denotes those CT's and CTP's which are effected by the preceeding criterion. CT's and CTP's underlined are those which have been affected by the criterion.

PRIMARY ALPHABETICAL LIST

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	abilities*
amount: data	abilities*
analysis (task)*	abilities*
analysis (task)*	ability*
analysis (task)*	ability*
diffusion: innovation*	aid
diffusion: innovation*	aptitude
environment (educational)*	aptitudes
environment (educational)*	assumption
environment (learning)*	behavior*
environment (learning)*	behavior*
experience (educational)	behavior*
experience (learning)	behavior*
experiences: learning	behavior*
form (media)	behaviors
forms (media)	behaviors
goal: instruction	capability
goals (instructional)	classroom*
management: learning	classroom*
management (learning)	descriptions
manager: learning	experiments
materials (learning)	film
materials (instructional)	instructor*
materials (recorded)	instructor*
media: instruction*	media*

Concept Term Phrases	Concept Terms
media: instruction*	media*
media: instruction*	media*
media (presentation)	media*
medium (instructional)	media*
medium (transmission)	media*
messages (audiovisual)	media*
messages (mediated)	media
nature: information	media*
needs (societal)	medium
patterns (cognitive)	microfilm
player (record)	motion
presentations (multimedia)	movement
projector (overhead)	picture
program (television)	pictures*
response: message	pictures*
responses: message	preference
self-instruction (mediated)	print
setting (instructional)	problem
situation (learning)*	problems
situation (learning)*	records
situation (learning)*	records
strips (film)	system*
strips (sound)	system*
systems (conveyance): forms (message)	tapes
system (television)	teacher*
teacher (human)*	teacher*
teacher (human)*	teacher*
technology: change (attitude)	teacher*
technology (disc)	television
technology (video)	theorists
theories: learning	
theories (learning)	
theory (learning)*	
theory (learning)*	
theory (learning)*	
time (processing)	
unit (playback)	
volume: information	

ALPHABETICAL LIST AFTER DUPLICATION

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	abilities (2)*
amount: data	ability (1)*
analysis (task) (2)	aid
diffusion: innovation (1)	aptitude*
environment (educational) (1)	aptitudes*
environment (learning) (1)	assumption
experience (educational)	behavior (4)*
experience (learning)*	behaviors*
experiences (learning)*	capability
form (media)*	
forms (media)*	classroom (1)
goal: instruction	descriptions
goals (instructional)	experiments
management: learning	film
management (learning)	
manager: learning	instructor (1)
materials (learning)	media (7)*
materials (instructional)	medium*
materials (recorded)	microfilm
media: instruction (2)	motion
media (presentation)	movement
medium (instructional)	picture*
medium (transmission)	pictures (1)*
messages (audiovisual)	preference
messages (mediated)	print
nature: information	problem*
needs (societal)	problems*
patterns (cognitive)	records
player (record)	system (1)
presentations (multimedia)	tapes
projector (overhead)	teacher (3)
program (television)	television
response: message*	theorists
responses: message*	
self-instruction (mediated)	
setting (instructional)	
situation (learning) (2)	
strips (film)	
strips (sound)	
systems (conveyance): forms (message)	
system (television)	
teacher (human) (1)	
technology: change (attitude)	
technology (disc)	
technology (video)	

Concept Term Phrases	Concept Terms
theories: learning	
theories (learning)*	
theory (learning) (2)*	
time (processing)	
unit (playback)	
volume: information	

ALPHABETICAL LIST AFTER COMBINING SINGULAR AND PLURAL FORMS

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	ability(s) (3)
amount: data	aid
analysis (task) (2)	aptitude(s)
diffusion: innovation (1)	assumption
environment (educational) (1)	behavior(s) (4)
environment (learning) (1)	capability
experience (educational)	classroom (1)
experience(s) (learning)	descriptions
form(s) (media)	experiments
goal: instruction*	film
goals (instructional)*	instructor (1)
management: learning*	medium(s) (7)
management (learning)*	microfilm
manager: learning	motion
materials (learning)	movement
materials (instructional)	picture(s) (1)
materials (recorded)	preference
media: instruction (2)*	print
media (presentation)	problem(s)
medium (instructional)*	records
medium (transmission)	system (1)
messages (audiovisual)	tapes
messages (mediated)	teacher (3)
nature: information	television
needs (societal)	theorists
patterns (cognitive)	
presentations (multimedia)	
projector (overhead)	
program (television)	
response(s): message	
self-instruction (mediated)	
setting (instructional)	
situation (learning) (2)	
strips (film)	
strips (sound)	
systems (conveyance): forms (message)	
system (television)	
teacher (human) (1)	
technology: change (attitude)	
technology (disc)	
technology (video)	
theories: learning*	
theory(s) (learning) (2)*	
time (processing)	
unit (playback)	
volume: information	

ALPHABETICAL LIST AFTER COMBINING CTP'S WITH SAME CT'S AND SAME/SIMILAR ADJECTIVES, DESCRIPTORS, OR MODIFIERS

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	ability(s) (3)*
amount: data*	aid
analysis (task) (2)	aptitude(s)
diffusion: innovation (1)	assumption
environment (educational) (1)*	behavior(s) (4)
environment (learning) (1)*	capability*
experience (educational)*	classroom (1)
experience(s) (learning)*	descriptions
form(s) (media)	experiments
goal(s) - instruction(al)	film
management - learning	instructor (1)*
manager: learning	medium(s) (7)
materials (learning)*	microfilm
materials (instructional)*	motion*
medium(s) - instruction(al) (2)	movement
medium (transmission)	picture(s) (1)
messages (audiovisual)*	preference
messages (mediated)	print
nature: information	problem(s)
needs (societal)	records
patterns (cognitive)	system (1)
presentations (multimedia)	tapes
projector (overhead)	teacher (3)*
program (television)	television
response(s): message	theorists
self-instruction (mediated)	
setting (instructional)	
situation (learning) (2)	
strips (film)	
strips (sound)	
systems (conveyance): forms (message)	
system (television)	
teacher (human) (1)*	
technology: change (attitude)	
technology (disc)	
technology (video)	
theory(s) - learning (2)	
time (processing)	
unit (playback)	
volume: information*	

ALPHABETICAL LIST AFTER COMBINING CT'S AND CTP'S
WITH SAME OR SIMILAR MEANING

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	aid
analysis (task) (2)	aptitude(s)
diffusion: innovation (1)	assumption
form(s) (media)*	behavior(s) (4)
goal(s) - instruction(al)	classroom (1)
management - learning	descriptions
manager: learning*	experiments
medium(s) - instruction(al) (2)*	film*
medium (transmission)*	medium(s) (7)*
nature: information	microfilm*
needs (societal)	picture(s) (1)*
patterns (cognitive)	preference
presentations (multimedia)*	print*
projector (overhead)*	problem(s)
program (television)*	records*
response(s): message	system (1)
self-instruction (mediated)*	tapes*
setting (instructional)*	television*
situation (learning) (2)*	theorists
strips (film)*	
strips (sound)*	
systems (conveyance): forms (message)*	
system (television)*	
teacher (human) (1)*	
technology: change (attitude)	
technology (disc)*	
technology (video)*	
theory(s) - learning (2)	
time (processing)	
unit (playback)*	

CT and CTP Combinations
amount: data/volume: information
environment (educational (1)/learning (1))*
experience(s) (educational/learning)*
instructor (1)/teacher (3)
materials (instructional/learning)
messages (audiovisual/mediated)*
motion/movement

ALPHABETICAL LIST AFTER COMBINING CT'S, CTP'S AND
CT AND CTP COMBINATIONS INTO GENERAL AREAS

Concept Term Phrases	Concept Terms
advancement: technology (instructional)	aid
analysis (task) (2)	aptitude(s)
diffusion: innovation (1)	assumption
goal(s) - instruction(al)	behavior(s) (4)
management - learning	classroom (1)
nature: information	descriptions
needs (societal)	experiments
patterns (cognitive)	preference
response(s): message	problem(s)
technology: change (attitude)	system (1)
theory(s) - learning (2)	theorists
time (processing)	

CT and CTP Combinations

environment (educational/learning)/setting (instructional)
experience(s) (educational/learning)/situation (learning) (2)
instructor (1)/manager: learning/teacher (3)/teacher (human) (1)

medium(s) (7) - instruction(al) (2)

film	form(s) (media)
microfilm	medium (transmission)
picture(s) (1)	messages (audiovisual/mediated)
print	presentations (multimedia)
records	projector (overhead)
tapes	program (television)
television	self-instruction (mediated)
	strips (film)
	strips (sound)
	systems (conveyance): forms (message)
	system (television)
	technology (disc)
	technology (video)
	unit (playback)

APPENDIX L

PCT AND PRP FREQUENCY OF USE LIST

APPENDIX L

PCT AND PRP FREQUENCY OF USE LIST

Primary Concept Term	Number of Appearances
attitude(s)*	6

TOTALS: PCT: 1
Number of Appearances: 6

Primary Reduced Phrases (CTP)	Number of Appearances
accounts*	4
activity(s)	4
area(s)	4
attempt(s)	4
content	4
cost(s)	4
efficiency	4
methodology(s)	4
mix	4
model(s)	4
packages	4
potential(s)	4
structure	4
style(s)	4
task(s)	4
basis	5
effectiveness	5
motivation(s)	5
time	5
type(s)	5
attention	6
interaction(s)	6
methods	6
principle	6

Primary Reduced Phrases (CTP) (cont.)	Number of Appearances
decision(s)	7
differences	7
literacy	7
means	7
results	7
approach(s)	8
communication(s)	8
feedback	8
form(s)	8
strategy(s)	8
technique(s)	8
knowledge	9
relationship(s)	9
objective(s)	10
analysis	11
base	11
conditions	11
effects	12
environment	12
skills	12
behavior(s)	13
design(s)	14
problem(s)	14
understanding	14
research	15
need(s)	16
evaluation(s)	17
concept(s)	18
technology(s)	18
theory(s)	18
development	24
system(s)	24
process(s)	26
learning	41

TOTALS: PRP (CTP): 58
Number of Appearances: 561

Primary Reduced Phrases (CT/CTP)	Number of Appearances
event(s)	4
human/man/person	4
amount/volume	5
material(s)	6
phases/stages	6
aspect(s)/part	7
characteristics/trait(s)	8
education/training	9
instructor/manager/teacher	9
goal(s)/mission	10
experience(s)/situation	12
function(s)/purpose(s)	12
data/fact/information	13
medium(s)**	14
ability(s)/capability(s)	15
learner(s)/student(s)	18
instruction	21
application(s)/use(s)	22

TOTALS: PRP (CT/CTP): 18
Number of Appearances: 195

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*The addition of the parentheses ( ) with an "s" indicates that (1) the final count of CT's and reduced phrases included a count of both plural and singular CT's and reduced phrases; or (2) all CT's and reduced phrases counted contained the (s).

Those PCT's and PRP's which include an "s" with no parentheses ( ) indicate that all CT's and reduced phrases counted were already pluralized during the final count for inclusion on the Frequency of Use List.

**The list of CT's and CTP's which was combined with the PRP medium(s) contained an additional count of 30. This list is not included above because no individual CT or CTP had an appearance of four or more; however, the list was included in the combining of statements during the fourth stage of analysis.

APPENDIX M

ANALYSIS OF STATEMENTS CONTAINING SELECTED PCT AND PRP'S

APPENDIX M

ANALYSES OF STATEMENTS CONTAINING

SELECTED PCT and PRP'S

Table 21: Statements Containing PCT and PRP's Selected for Review

Statement Category	Statements Containing PCT and PRP	Statements Not Containing PCT or PRP
Definition		
Equal	50	15
Congruent	5	5
Component	27	8
Rule		
Goal/Objective/Task	1	1
Must	17	10
Need/Ought/Should	14	8
Could/May/Might	6	3
Relationship		
Strict	43	17
Loose	27	10
(Present)	(19)	(6)
(Past/Future)	(8)	(4)
Description	24	7
TOTAL	214	84

Table 22: Frequency of Statements Containing PCT/PRP as Submitted by Respondents

Respondents	Definition			Rule				Relationship			Description	TOTAL
	Equal	Congruent	Component	Goal/Objective/ Task	Must	Need/Ought/ Should	Could/May/ Might	Strict	Loose			
									Present	Past/Future		
1	1	4	0	0	0	0	0	1	0	0	0	6
2	1	0	0	0	0	1	0	0	0	0	1	3
3	3	0	1	0	0	0	0	2	0	0	1	7
4	1	0	1	0	1	1	0	2	0	0	2	8
5	2	0	1	0	0	0	0	1	3	0	0	7
6	0	0	0	0	2	0	0	0	0	0	0	2
7	2	0	0	0	0	0	0	1	0	0	0	3
8	0	0	0	0	0	0	0	0	5	0	0	5
9	0	0	1	0	1	1	0	1	0	0	0	4
10	1	0	0	0	0	0	0	0	0	0	1	2
11	0	0	0	0	0	2	0	0	0	0	0	2
12	1	0	1	0	0	0	1	1	0	0	0	4
13	1	0	0	0	0	0	0	0	0	0	0	1
14	0	0	0	0	0	0	3	1	1	0	0	5
15	1	0	1	0	0	0	0	0	0	0	0	2
16	0	0	0	0	0	0	0	0	1	0	0	1
17	3	1	2	0	1	1	0	1	1	0	2	12
18	0	0	0	0	2	0	0	0	0	0	0	2
19	0	0	1	0	0	1	0	1	0	0	0	3
20	3	0	1	0	0	0	1	0	0	0	1	6
21	1	0	0	0	0	0	0	0	0	0	1	2
22	0	0	1	0	2	0	0	1	2	1	0	7
23	0	0	4	0	2	0	0	1	2	0	0	9
24	0	0	0	0	2	0	0	0	1	0	2	5
25	1	0	1	0	0	1	0	2	0	0	1	6
26	1	0	0	0	0	0	0	0	0	0	0	1
27	1	0	0	0	0	0	0	2	0	0	0	3
28	1	0	2	0	0	0	0	2	0	0	1	6
29	0	0	2	0	0	0	0	1	0	0	0	3
30	2	0	0	0	0	0	0	2	0	0	1	5
31	0	0	2	0	0	1	0	0	0	0	0	3
32	6	0	0	0	0	0	0	0	0	0	1	7
33	0	0	0	0	0	1	1	1	1	0	0	5
34	0	0	0	0	0	0	0	2	0	0	0	2
35	0	0	1	0	1	0	0	0	1	0	1	4
36	1	0	0	0	0	0	0	3	0	0	0	4
37	1	0	0	0	0	1	0	1	0	0	0	3
38	2	0	0	0	1	0	0	0	0	3	1	7
39	2	0	0	0	0	0	0	1	0	0	2	5
40	1	0	1	0	1	1	0	8	0	0	2	14
41	4	0	1	0	1	0	0	2	1	1	2	12
42	3	0	0	0	0	0	0	2	0	0	1	6
43	1	0	1	1	0	0	0	0	0	1	0	4
44	1	0	1	0	0	2	0	0	0	1	0	5
45	1	0	0	0	0	0	0	0	0	0	0	1
Subtotal	50	5	27	1	17	14	6	43	19	8	24	
TOTAL		82				38			70		24	214

Table 23: Frequency of PCT/PRP's Contained Within Statements

Statements	Number of PCT/PRP's Contained				
	1	2	3	4	5
Definition					
Equal	33	15	2	0	0
Congruent	2	0	3	0	0
Component	13	10	2	0	2
Rule					
Goal/Objective/Task	1	0	0	0	0
Must	11	6	0	0	0
Need/Ought/Should	8	5	1	0	0
Could/May/Might	3	2	1	0	0
Relationship					
Strict	24	13	6	0	0
Loose	20	6	1	0	0
(Present)	(13)	(5)	(1)	(0)	(0)
(Past/Future)	(7)	(1)	(0)	(0)	(0)
Description	18	6	0	0	0
TOTAL	133	63	16	0	2

APPENDIX N

ANALYSES OF CT'S AND CTP'S IDENTIFIED IN STATEMENTS CONTAINING PCT AND PRP'S

APPENDIX N

ANALYSES OF CT'S AND CTP'S IDENTIFIED IN STATEMENTS CONTAINING PCT AND PRP'S

Table 24: CT's and CTP's Identified in Statements Containing PCT/PRP's

PCT/PRP	CT's Not Representing PCT/PRP	CTP's Not Representing PCT/PRP	CT's Representing PCT/PRP	CTP's Representing PCT/PRP
PCT				
attitude(s)	8	10	5	1
PRP-CTP				
behavior(s)	15	21	6	7
communication(s)	10	8	5	3
decision(s)	3	21	2	5
design(s)	8	48	0	14
development	14	61	1	23
evaluation	15	34	3	14
feedback	7	14	4	4
knowledge	8	19	3	6
learning	44	95	23	18
method(s)	8	17	1	5
methodology(s)	3	6	1	3
model(s)	4	8	0	4
objective(s)	13	17	4	6
process	8	45	4	22
research	10	38	3	12
system(s)	12	38	4	20
technology(s)	16	37	4	14
theory(s)	14	22	1	17
PRP-CT/CTP				
application(s)/use(s)	21	55	2	20
data/fact/information	12	18	5	8
education/training	7	41	5	4
instruction	15	38	10	11
instructor/manager/teacher	6	15	6	3
learner(s)/student(s)	20	41	14	4
material(s)	5	15	2	4
Medium(s) & Combined List	21	49	21	23
(medium(s)*)	(32)	(68)	(10)	(4)
(Combined List)	(31)	(53)	(11)	(19)
TOTAL	**	**	139	275

*Medium(s) was combined with 30 CT's and CTP's in Alpha List IV. The combined list is included separately and together with the PRP above for comparative purposes. The clustering activity preceeding this step in the analysis stage included medium(s) with the combined list.

**Because 81 statements contained more than one PCT/PRP, CT's and CTP's in these statements were identified with more than one PCT/PRP; therefore the cumulative total would not accurately represent the total CT's and CTP's used. Table 25 details the results of this analysis.

Table 25: Summary of CT's and CTP's Identified in Statements Containing PCT and PRP's

Statements	CT's in Statements Containing PCT/PRP's	CTP's in Statements Containing PCT/PRP's
Definition		
Equal	63	150
Congruent	8	14
Component	55	105
Rule		
Goal/Objective/Task	3	1
Must	23	44
Need/Ought/Should	20	44
Could/May/Might	5	27
Relationship		
Strict	61	123
Loose	18	97
(Present)	(15)	(77)
(Past/Future)	(3)	(20)
Description	27	80
TOTAL	283	685

APPENDIX O

SUMMARY OF PROCEDURES USED TO DEVELOP CLUSTERS AND STATEMENT GROUPS

APPENDIX O

SUMMARY OF PROCEDURES USED TO DEVELOP CLUSTERS AND STATEMENT GROUPS

STEP 1: Selection of PCT or PRP from Frequency of Use List

PRP selected: objective(s), reflecting a major focus in the field

STEP 2: Identification of all useable statements containing the PRP

Differences among affective, cognitive, and psychomotor learning demand that media characteristics be matched with learning objectives for maximum effectiveness in learning.

Accountability is a management concept or policy which involves agreeing upon objectives, deciding upon the input to achieve the objectives, and measuring the output to see the degree to which the objectives have been met.

Given an understanding of basic learning theory, objectives can be originated and sequenced for easier learning using the principles involved in learning psychology.

The ability to increase the visibility of the learning process and to combine humane and technological concerns through systems planning could increase our capability to better identify and monitor the accomplishing of system, program, student and enabling objectives.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

Objectives must be defined relative to full human needs and not limited by assessment capabilities.

For sophistication in instruction, the communicator must first determine the appropriate perceptual stimuli (sensory experience) which meet learner needs and objectives before determining which media and channels to use.

STEP 3: Identification of concept terms and concept term phrases contained in statements

CT's

ability
capability
learning
communicator
media
channels
learner
accountability
output
degree
input
statement
behavior

CT as PRP

objective
objectives (6)

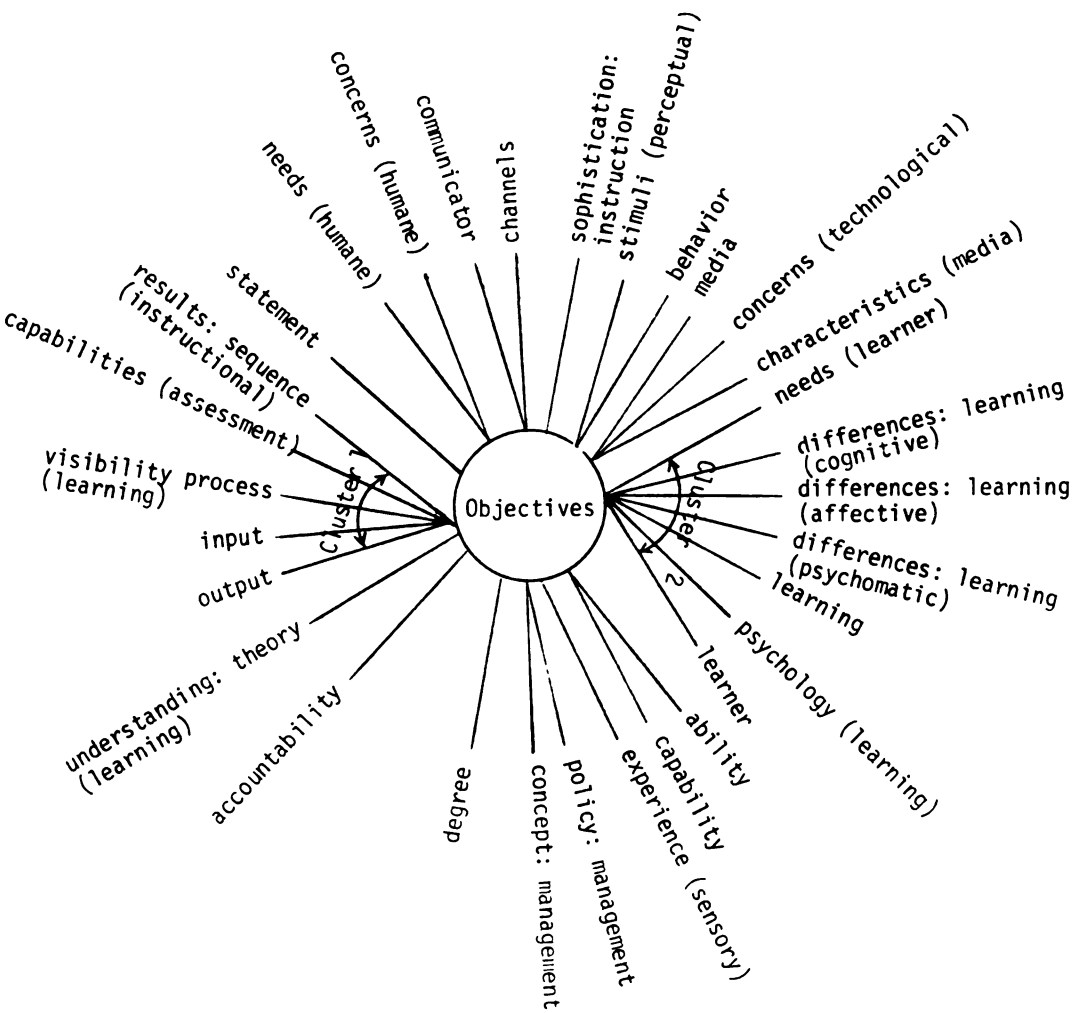
CTP's

visibility: process (learning)
concerns (humane)
concerns (technological)
understanding: theory (learning)
psychology (learning)
differences: learning (affective)
differences: learning (cognitive)
differences: learning (psychomotor)
characteristics (media)
sophistication: instruction
stimuli (perceptual)
experience (sensory)
needs (learner)
needs (human)
capabilities (assessment)
concept: management
policy: management
result: sequence (instructional)

CTP's containing PRP

objectives (system)
objectives (program)
objectives (student)
objectives (enabling)
objectives (learning);
effectiveness: learning
objectives (behavioral)

STEP 4: Clustering of concept terms and concept term phrases.



Cluster 1

differences: learning (cognitive)
differences: learning (affective)
differences: learning (psychomotor)
learner
psychology (learning
needs (learner)

Cluster 2

input
output
capabilities (assessment)
visibility: process (learning)
results: sequence (instruction)

STEP 5: Combining statements into groups

Statement Group 1

Differences among affective, cognitive, and psychomotor learning demand that media characteristics be matched with learning objectives for maximum effectiveness in learning.

Given an understanding of basic learning theory, objectives can be originated and sequenced for easier learning using the principles involved in learning psychology.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

For sophistication in instruction, the communicator must first determine the appropriate perceptual stimuli (sensory experience) which meet learner needs and objectives before determining which media and channels to use.

Statement Group 2

Accountability is a management concept or policy which involves agreeing upon objectives, deciding upon the input to achieve the objectives, and measuring the output to see the degree to which the objectives have been met.

The ability to increase the visibility of the learning process and to combine humane and technological concerns through systems planning could increase our capability to better identify and monitor the accomplishing of system, program, student and enabling objectives.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

Objectives must be defined relative to full human needs and not limited by assessment capabilities.

APPENDIX P

SUMMARY OF THE PCT AND PRP'S REVIEWED AND THE CLUSTERS DEVELOPED

Table 28: Summary of PCT/PRP's Reviewed and the Clusters Developed.

PCT/PRP	Statements Containing PCT or PRP	Respondents	Sub-Total CT's in Statements*	Total CT's in Statements*	Sub-Total CTP's in Statements*	Total CTP's in Statements*	Clusters Formed
PRP's with 20 or more appearances							
learning (41)**	36	23	44	67	95	113	10
process(s) (26)	13	12	8	12	45	67	4
system(s) (24)	17	11	12	16	38	58	4
development (24)	17	15	14	15	61	84	6
application(s)/use(s) (22)	20	13	21	23	55	75	3
instruction (21)	17	14	15	25	38	49	4
PRP's reflecting major interest areas from organizational names							
theory(s) (18)	12	7	14	15	22	39	4
technology(s) (18)	16	12	16	20	37	51	3
research (15)	11	11	10	13	38	50	2
design(s) (14)	12	8	8	8	48	62	3
medium(s) (14) and combined list (30)***	25	12	21	42	49	72	4
(medium(s) (14))	(12)****	(8)****	(32)	(42)	(68)	(72)	*****
(combined list (30))	(17)****	(9)****	(31)	(42)	(53)	(72)	*****
data/fact/information (13)	8	7	12	17	18	26	2
education/training (9)	8	6	7	12	41	45	2
communication(s) (8)	8	6	10	15	8	11	1
PRP's reflecting major interest areas							
learner(s)/student(s) (18)	16	12	20	34	41	45	4
evaluation(s) (17)	13	11	15	18	34	48	1
behavior(s) (13)	11	9	15	21	21	28	3
objective(s) (10)	7	6	13	17	18	24	2
instructor/manager/teacher (9)	7	5	6	12	15	18	1
knowledge (9)	8	6	8	11	19	25	1
feedback (8)	7	4	7	11	14	18	0
decision(s) (7)	6	3	3	5	21	26	2
material(s) (6)	5	5	5	7	15	19	2
method(s) (6)	5	4	8	9	17	22	0
methodology(s) (4)	3	3	3	4	6	9	0
model(s) (4)	4	4	4	4	8	12	0
PCT							
attitude(s) (6)	5	4	8	13	10	11	1

TOTALS: Number of Primary Reduced Phrases reviewed for clustering: 26
Number of Primary Reduced Phrases involved in clustering: 22
Number of Primary Concept Terms reviewed for clustering: 1
Number of Primary Concept Terms involved in clustering: 1
Number of Clusters formed: 69

*Sub-totals exclude the PCT and PRP's being reviewed as they occur as CT's or CTP's in statements; totals include the PCT and PRP's being reviewed as they occur in CT's or CTP's in statements.

**Numbers in parentheses indicate the frequency of occurrence within statements as a CT and/or CTP.

***Medium(s) include a review of all CT's and CTP's on the combined list as shown in Alpha List III.

****Sub-totals of statements and respondents for medium(s) and the combined list do not equal the totals because the final count included statements which included both the PRP and CT's and CTP's from the combined list and respondents submitted statements containing both the PRP and CT's and CTP's from the combined list.

*****The clustering activity utilized statements containing the PRP and the CT's and CTP's from the combined list. No individual clustering of statements containing only the PRP or only the CT's and CTP's from the combined list was attempted.

APPENDIX Q

SUBJECT AND COMPLEMENT PLACEMENT OF PCT/PRP'S BY CATEGORY OF STATEMENT

APPENDIX Q

SUBJECT AND COMPLEMENT PLACEMENT OF PCT/PRP'S BY CATEGORY OF STATEMENT

Table 29: Summary of PCT/PRP Placement in Statements

PCT/PRP	Definition N=82			Rule N=38			Relationship N=70			Description N=24			Statements Containing PCT/PRP
	S*	C*	0*	S	C	0	S	C	0	S	C	0	
attitude(s)	1	2	0	0	1	0	0	0	1	0	0	0	5
behavior(s)	1	3	0	1	1	0	1	2	0	1	1	0	11
communication(s)	2	3	0	0	0	0	0	1	0	2	0	0	8
decision(s)	1	2	0	1	1	0	1	0	0	0	0	0	6
design(s)	3	3	0	2	0	0	1	2	0	0	1	0	12
development	3	7	0	2	0	0	1	3	0	1	0	0	17
evaluation(s)	5	5	1	0	0	0	1	1	0	0	0	0	13
feedback	3	2	1	0	0	0	1	0	0	0	0	0	7
knowledge	0	3	0	0	0	0	3	1	0	1	0	0	8
learning	7	4	2	3	4	0	7	4	2	0	3	0	36
method(s)	1	2	0	0	0	0	1	1	0	0	0	0	5
methodology(s)	0	0	0	1	0	0	0	1	0	1	0	0	3
model(s)	1	0	0	0	0	0	1	2	0	0	0	0	4
objective(s)	1	1	0	1	1	0	1	2	0	0	0	0	7
process(s)	3	7	0	0	0	0	0	1	0	0	2	0	13
research	0	1	0	2	4	0	2	1	0	0	1	0	11
system(s)	3	3	0	1	1	0	3	1	1	4	0	0	17
technology(s)	7	3	0	2	0	0	2	1	0	1	0	0	16
theory(s)	4	2	0	0	0	0	1	3	1	1	0	0	12
application(s)/ use(s)	5	1	0	1	3	0	5	3	0	0	2	0	20
data/fact/ information	0	2	0	0	1	0	1	3	0	0	1	0	8
education/ training	1	3	0	1	1	0	1	1	0	0	0	0	8
instruction	4	0	0	2	2	0	3	6	0	0	0	0	17
instructor/manager/ teacher	0	0	0	2	0	0	2	2	0	0	1	0	7
learner(s)/ student(s)	0	5	0	1	3	0	2	5	0	0	0	0	16
material(s)	0	2	0	0	3	0	0	0	0	0	0	0	5
medium(s) and combined list	2	0	1	2	3	1	5	3	2	2	1	3	25
Sub-Total**	20	22	4	16	14	1	22	23	5	9	9	1	
TOTAL		25			19			26			16		214***

*S = subject; C = complement; 0 = placement in both subject and complement of statement.

**All totals are contained within the PCT and 26 PRP's listed above.

***Statements contained from one to five PCT/PRP's.

APPENDIX R

STATEMENTS BY CATEGORY CONTAINING

SELECTED PRP'S

APPENDIX R

STATEMENTS BY CATEGORY CONTAINING

SELECTED PRP'S

PRP: DEVELOPMENT

1. Category of Statement: Definition (equal)
   Placement in Statement: Complement

   Learning is a predisposition to a relatively permanent change in behavior not explanable by growth and development.

   The instructional systems development process is a logical extension and combination of the principles of programmed instruction and the systems engineering concepts used in the development of complex defense and space systems.

   The empirical inquiry technology base is the critical attribute which distinguishes intuitive development and evaluation from systematic development and evaluation.

2. Category of Statement: Definition (component)
   Placement in Statement: Complement

   Application of the systems concept involves at least three phases, anywhere and anyplace: (1) system analysis and design, which is primarily an analytical process; (2) system development, which is accomplished through the tedious and demanding process of research and development; and (3) system management, which is primarily an administrative task and inevitably done very badly in institutional education from behind the well-guarded desks of the principal, the superintendent, or the vice-president of academic affairs.

   General systems theory subsumes instructional development.

   Formative and summative evaluation are critical in sound instructional development.

The observable differences between children of different social classes lie in the development of standard languages, motivation to secure as much education as possible, willingness to work for teacher approval, acceptance of learning tasks with a minimum of rebellion, and appropriate home and school conditions which can significantly modify these conditions.

PRP: EVALUATION(S)

1. Category of Statement: Definition (component)
   Placement in Statement: Subject

   Program evaluation incorporates all descriptions and inferential data.

   Summative evaluation of programs allows for better plans and decisions to be made based upon attainment or non-attainment of objectives.

   Formative evaluation allows for adjustment in the design and implementation of instructional materials used in an on-going project.

   Formative and summative evaluation are critical in sound instructional development.

   Evaluation is a significant aspect of technology since it is necessary for feedback, validation, etc.

2. Category of Statement: Definition (equal)
   Placement in Statement: Complement

   The empirical inquiry technology base is the critical attribute which distinguishes intuitive development and evaluation from systematic development and evaluation.

3. Category of Statement: Definition (component)
   Placement in Statement: Complement

   Design decisions are those bearing upon design, testing, revision, and evaluation of the instructional product.

The diffusion of an innovation can be considered in terms of an individual's levels of decision-making: awareness, interest, evaluation, trial and adoption/rejection of the innovation. (This statement occurred two times in this category.)

PRP: FEEDBACK

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   Feedback is a critical concept in technology and is an essential one to differentiate traditional from more current approaches to learning.

   Positive and negative feedback are complementary terms.

   Positive feedback refers to a volume of information that exceeds a given systems capability during a given time period.

   Negative feedback is a response or responses to a given message that is either anticipated or within a given systems goal structure.

PRP: LEARNING

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   Learning is a change in human disposition or capability which can be retained and which is not simply ascribable to the process of growth.

   Concept learning and rule learning are types which some theorists have attempted to classify into hierarchies.

   Learning is a predisposition to a relatively permanent change in behavior not explanable by growth and development.

2. Category of Statement: Definition (congruent)
   Placement in Statement: Subject

   Meaningful learning is a concept that is congruent with educational communications and technology.

3. Category of Statement: Definition (component)
   Placement in Statement: Subject

   Learning can be maximized if there is a match among learner trait, media, message, and task.

   Learning and learning environment consist of the knowledge, abilities and attitudes associated with the curriculum; learning theories as they relate to human growth and behavior; and strategies for teaching and learning within the life-space of the individual.

4. Category of Statement: Definition (equal)
   Placement in Statement: Complement

   Visual literacy is an inadequate, but evaluing, description for a set of cognitive and affective information processing skills which can be enhanced through exposure and training and utilized to promote visual and non-visual learning.

   The central problem of education is not learning, but the management of learning.

   Measuring progress is the ways and means of looking at student learning.

   Instruction is the interaction of a teacher (or mediated form of a teacher) and a learner in a purposive, goal-oriented task intended to facilitate learning.

   Time primacy in communications says that learning takes time and results are proportional to time expended.

5. Category of Statement: Rule (must)
   Placement in Statement: Complement

   In today's society, total community involvement must be programmed into learning.

6. Category of Statement: Rule (need/ought/should)
   Placement in Statement: Complement

   Research needs to be undertaken into the factors that start to answer why rather than purely describe a situation, e.g., what perceptual cues are important for learning and how can they be utilized.

   Media is concerned with stimulus presentation, thus media research should be concerned with the impact of various manipulations of stimulus presentation on the psychological variables of cognition which govern learning.

7. Category of Statement: Rule (could/may/might)
   Placement in Statement: Complement

   The use of cognitive style may enable an instructional designer to define and produce instructional materials which match a learner's perceptual and cognitive patterns, thus facilitating learning of the content so designed.

8. Category of Statement: Relationship (strict)
   Placement in Statement: Subject

   Mastery learning is dependent upon the size of the learning task, student self-pacing, the amount and type of active participation, the schedule of reinforcement and the amount of learning time involved.

   When one group achieves optimum learning with one treatment and a second group differing on that aptitude or trait reveals a greater achievement with the other treatment, the instructional setting should provide for differences in learner abilities.

   Meaningful learning assumes the learner can positively identify with the mode and method of instruction.

   Learning fails when time for reading is utilized for other purposes.

   Generalizations that can be made about learning come only from observations of the conditions in which learning occurs.

9. Category of Statement: Relationship (loose/present)
   Placement in Statement: Subject

   Learning through visual means more often occurs than that using any other sense.

10. Category of Statement: Relationship (strict)
    Placement in Statement: Complement

    Because of the physiological limitations in humans to process information (sensory input), except in linear fashion, multi-media presentations, gestalt, [and] zap exposures to sensory overload interferes with learning.

    Given an understanding of basic learning theory, objectives can be originated and sequenced for easier learning using the principles involved in learning psychology.

    The closer instruction approaches realism, the more likely will be effective learning.

11. Category of Statement: Relationship (loost/present)
    Placement in Statement: Complement

    Organized, planned, instructional development based upon job task data analysis provides for efficient instruction and effective learning.

12. Category of Statement: Relationship (loose/past/future)
    Placement in Statement: Complement

    Organization of all human knowledge into one unified system is possible and will greatly simplify learning about life.

PRP: PROCESS(S)

1. Category of Statement: Definition (equal)
   Placement in Statement: Complement

   Learning is a change in human disposition or capability which can be retained and which is not simply ascribable to the process of growth.

   Concept formation is the process through which we develop learning styles.

Formative evaluation is an on-going process that seeks information during the development of an educational entity (e.g., curriculum, instructional strategy or design of an instructional medium), whereas summative evaluation seeks information about the merits and shortcomings of the completed entity.

Visual literacy is the process of developing skill in handling perceptual phenomena.

2. Category of Statement: Definition (component)
   Placement in Statement: Complement

The attempt to describe and predict the important area of simulation can be used to provide researchable hypotheses and to describe problems associated with processes especially important as educational technology is most importantly process-based.

Technology as a concept involves processes, products, and the facilitating environment.

Application of the systems concept involves at least three phases, anywhere and anyplace: (1) system analysis and design, which is primarily an analytical process; (2) system development, which is accomplished through the tedious and demanding process of research and development; and (3) system management, which is primarily an administrative task and inevitably done very badly in institutional education from behind the well-guarded desks of the principal, the superintendent, or the vice-president of academic affairs.

PRP: SYSTEM(S)

1. Category of Statement: Description
   Placement in Statement: Subject

Although a few general characteristics of information processing systems have reductionistic features (processing time, input-output capacity, representative structuring), the effective cognitive system is highly specific to individuals or limited groups of individuals and thus useful predictions of behavior, e.g., learning, must be restricted and universal predictive laws consistently fail.

Systems tend toward equilibrium.

An effective, on-going system can be sustained with local staff under realistic local budget lines.

Under such conditions [when at least one completely justifiable use for television calls on its full potentials], a television system can also be utilized for any telecommunication purpose, in full or partial modes, audio only, still pictures only, or simply as a transmission medium to distribute recorded materials.

PRP: TECHNOLOGY(S)

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   Learning theory, as applied to educational technology, is predominantly behavioristic in origin.

   The right size technology is that size and complexity which are necessary to serve well the essential education-learning functions without excess or waste of resources.

   Video disc technology is such a pervasive change agent that it will likely replace most films, tapes, books, newspapers, "hi-fi," sound film strips, and microfilms.

   The fact that technology has no inherent value system in theory does not mean that it has no value system in practice, e.g., witness the Luddites or Amish and their reactions to technology.

   Technologies of instruction are the techniques of designing specific message systems.

   Instructional technology is the totality of the instructional process and related support services, e.g., data processing.

2. Category of Statement: Definition (component)
   Placement in Statement: Subject

   Technology as a concept involves processes, products, and the facilitating environment.

PRP: THEORY(S)

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   Learning theory, as applied to educational technology, is predominantly behavioristic in origin.

   Modern learning theory is response oriented and the stimulus is taken for granted.

2. Category of Statement: Definition (component)
   Placement in Statement: Subject

   Theory of instruction requires setting instructional goals, analyzing learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally, evaluating outcomes relative to goals and learners.

   General systems theory subsumes instructional development.

PRP: APPLICATION(S)/USE(S)

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   The use of media in instruction is not the same as applying technology to instruction.

   The use of an advance organizer before instruction is a valid way to ensure comprehension.

   The use of the systems approach is an appropriate means of examining and understanding the complex educational social environment.

2. Category of Statement: Definition (component)
   Placement in Statement: Subject

   Application of the systems concept involves at least three phases, anywhere and anyplace: (1) system analysis and design, which is primarily an analytical process; (2) system development, which is accomplished through the tedious and demanding process of research and development; and (3) system

management, which is primarily an administrative task and inevitably done very badly in institutional education from behind the well-guarded desks of the principal, the superintendent, or the vice-president of academic affairs.

3. Category of Statement: Relationship (strict)
   Placement in Statement: Subject

   The use of mediated instruction, as a part of instructional technology, forces changes in the nature of instruction from labor intensive to machine/materials intensive, basic assumptions/philosophies to the surface, and a systematic (or "systems") approach to instruction.

   The use of appropriate message forms in a contingency management, reward-punishment setting, can accelerate behavior modification.

   The use of rhythmic devices to teach determines retention and to some degree motivation.

   The use of visual materials in teaching increases student comprehension of content material.

4. Category of Statement: Relationship (loose/present)
   Placement in Statement: Subject

   The application of the systems approach coupled with the concept of personalized instruction encourages the infusion of instructional technology into the learning environment to maximize educational opportunities.

PRP: INSTRUCTION

1. Category of Statement: Definition (equal)
   Placement in Statement: Subject

   Instruction is the interaction of a teacher (or mediated form of a teacher) and a learner in a purposive, goal-oriented task intended to facilitate learning.

   Learning and instruction are opposite sides of the same coin: the student's job is to learn; the teacher's job (or instructional personnel of any sort) is to create situations and experiences in which the desired learning takes place.

2. Category of Statement: Definition (congruent)
   Placement in Statement: Subject

   Competency-based instruction can be interpreted to cover those programs which compensate for specific aptitudes and properly interact with them.

   Visual instruction and visual literacy are terms which imply aptitude-treatment interaction for designs for learning in order to determine how specific students respond and interact to specific forms of instruction employing visual designs.

3. Category of Statement: Relationship (strict)
   Placement in Statement: Complement

   The complex of individual differences each learner contains will affect directly responses to given forms of messages used for instruction.

   Theory building seems dependent very largely if not predominantly upon the development of inquiry technology oriented to the short-term contrived-designed-artificial phenomena that defines instruction.

   What you teach, how you approach instruction, depends on your theory of what "mind" is.

4. Category of Statement: Relationship (loose/present)
   Placement in Statement: Complement

   The message designer is concerned with the production of procedures and materials to be used in instruction, following the basic systems model.

PRP: LEARNER(S)/STUDENT(S)

1. Category of Statement: Definition (equal)
   Placement in Statement: Complement

   The mastery learning concept is perhaps the only applicable one when dealing with health-science students.

   A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

2. Category of Statement: Definition (congruent)
   Placement in Statement: Complement

   Visual instruction and visual literacy are terms which imply aptitude-treatment interaction for designs for learning in order to determine how specific students respond and interact to specific forms of instruction employing visual designs.

3. Category of Statement: Definition (component)
   Placement in Statement: Complement

   A set of techniques, sometimes called "brainstorming," can be organized and designed into an instructional program so as to provide the learner with information generating and evaluating skills, applicable to a wide range of content areas.

   Theory of instruction requires setting the instructional goals, analyzing learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally, evaluating outcomes relative to goals and learners.

4. Category of Statement: Relationship (strict)
   Placement in Statement: Complement

   It [learning environment] has a bearing on the way a learning situation will be perceived by the student (learner) and thus effects the teaching and approach that will be most effective.

   The relationship between information processing theories and media forms will assist in the development of some realistic differences between the processes required of the viewer or student.

   The characteristics of a given learning space will enhance or detract learners from obtaining maximum benefits from given kinds of instructional strategies and communication forms.

   Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.

   Meaningful learning assumes the learner can positively identify with the mode and method of instruction.

PRP: MEDIUM(S) WITH COMBINED LIST

1. Category of Statement: Relationship (strict)
   Placement in Statement: Subject

   Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.

   Given media require specific methodologies in use to enhance their effectiveness in meeting given learning objectives.

   Audiovisual messages follow an inductive design rather than the traditional deductive conventions.

   Because of the physiological limitations in humans to process information (sensory input), except in linear fashion, multi-media presentations, gestalt, and zap exposures to sensory overload interferes with learning.

2. Category of Statement: Relationship (loose/present)
   Placement in Statement: Subject

   Presentation media which present sensory cues most similar to those associated with the learning task will be most effective in promoting transfer from the learning environment to the real-world environment.

APPENDIX S

STATEMENT GROUPS AND CORRESPONDING CLUSTERS SELECTED FOR REVIEW AS TENTATIVE THEORIES

APPENDIX S

STATEMENT GROUPS AND CORRESPONDING CLUSTERS

SELECTED FOR REVIEW AS TENTATIVE THEORIES

DESIGN(S): Primary Reduced Phrase (CTP)

Cluster 2 (components of instructional development)

function (design)
testing: units (instructional)
planning: units (instructional)
production: units (instructional)
revision: product (instructional)
evaluation: product (instructional)
facilitation: learning: students: constraints (time)
facilitation: learning: students: constraints (monetary)
forms: evaluation
development (instructional)
application: concept (systems)
analysis (system)
process (analytical)
development (system)
process (demanding): development
process (tedious): development
management (system)

Statement Group 2

Design function is related both to design of resources as well as design of instruction.

Systems design allows for the efficient planning, production and testing of instructional units which results in learning efficiency and reduced training costs.

Design decisions are those bearing upon design, testing, revision, and evaluation of the instructional product.

Visual instruction and visual literacy are terms which imply aptitude-treatment interaction for designs for learning in order to determine how specific students respond and interact to specific forms of instruction employing visual designs.

Instructional design is the relationship of one or more educational factors (such as education background of student population, media use, stimulus-response relationships, and order of presentation of subject matter) prepared in a manner that maximizes the facilitation of learning for the largest number of students within given monetary or time constraints.

Instructional design/development must incorporate several forms of evaluation.

Application of the systems concept involves at least three phases, anywhere and anyplace: (1) system analysis and design, which is primarily an analytical process; (2) system development, which is accomplished through the tedious and demanding process of research and development; and (3) system management, which is primarily an administrative task and inevitably done very badly in institutional education from behind the well-guarded desks of the principal, the superintendent, or the vice-president of academic affairs.

LEARNING: Pirmary Reduced Phrase (CTP)

Cluster 1 (learner characteristics)

matching: styles (learning): motivation (human)
matching: styles (learning): experiences (human)
matching: styles (learning): events (human)
matching: styles (learning): resources (human)
matching: styles (cognitive): motivation (human)
matching: styles (cognitive): experiences (human)
matching: styles (cognitive): events (human)
matching: styles (cognitive): resources (human)
trait
match: trait (learner)
patterns (learner)
patterns (perceptual)
patterns (cognitive)
use: style (cognitive)

Statement Group 1

The intents toward mastery and hierarchical learning might be better effectuated through the matching of learning and cognitive styles with appropriate motivations, experiences, events, and resources, human and other.

Learning can be maximized if there is a match among learner trait, media, message, and task.

When one group achieves optimum learning with one treatment and a second group differing on that aptitude or trait reveals a greater achievement with the other treatment, the instructional setting should provide for differences in learner abilities.

The use of cognitive style may enable an instructional designer to define and produce instructional materials which match a learner's perceptual and cognitive patterns, thus facilitating learning of the content so designed.

Cluster 4 (components of instruction)

training
instruction
instruction
instruction
instruction
management: learning
job (teacher)
job: personnel (instructional)
interaction: teacher: task (goal-oriented)
interaction: learner: task (goal-oriented)

Statement Group 4

Organized, planned, instructional development based upon job, task, data analysis provides for efficient instruction and effective learning.

The closer instruction approaches realism, the more likely will be effective learning.

The central problem of education is not learning, but the management of learning.

Learning and instruction are opposite sides of the same coin: the student's job is to learn; the teacher's job (or instructional personnel of any sort) is to create situations and experiences in which the desired learning takes place.

Instruction is the interaction of a teacher (or mediated form of a teacher) and a learner in a purposive, goal-oriented task intended to facilitate learning.

Visual literacy is an inadequate, but evaluating, description for a set of cognitive and affective information processing skills which can be enhanced through exposure and training and utilized to promote visual and non-visual learning.

Cluster 9 (media/information)

information
materials (instructional)
curriculum
input (sensory)
cues (perceptual)
messages (mediated)
presentations (multi-media)
forms (message)
media
interaction: form (mediated): task
match: media
match: message
presentation (stimulus)
impact: manipulations: presentation (stimulus)

Statement Group 9

Because of the physiological limitations in humans to process information (sensory input), except in linear fashion, multi-media presentations, gestalt, zap exposures to sensory overload interferes with learning.

Message forms (media) can be arranged in a concrete-abstract continuum in terms of the relationship of a given medium to the reality it represents, with implications of greater or fewer reality cues affecting learning.

Learning and learning environment consists of the knowledge, abilities and attitudes associated with the curriculum; learning theories as they relate to human growth and behavior; and strategies for teaching and learning within the life-space of the individual.

Learning can be maximized if there is a match among learner trait, media, message and task.

Media is concerned with stimulus presentation, thus media research should be concerned with the impact of various manipulations of stimulus presentation on the psychological variables of cognition which govern learning.

Research needs to be undertaken into the factors that start to answer why rather than purely describe a situation, e.g., what perceptual cues are important for learning and how they can be utilized.

Learning may occur in either the interpretation of interactions or mediated messages.

The use of cognitive style may enable an instructional designer to define and produce instructional materials which match a learner's perceptual and cognitive patterns, thus facilitating learning of the content so designed.

Cluster 10 (learning environment)

situations: learning
experiences: learning
environment (learning)
classroom
setting (instructional)

Statement Group 10

Learning and instruction are opposite sides of the same coin: the student's job is to learn; the teacher's job (or instructional personnel of any sort) is to create situations and experiences in which the desired learning takes place.

Learning and learning environment consist of the knowledge, abilities and attitudes associated with the curriculum; learning theories as they relate to human growth and behavior; and strategies for teaching and learning within the life-space of the individual.

Learning must extend beyond the classroom; it must involve parents in the classroom and motivate the parents to encourage (motivate) learning as a lifelong activity.

When one group achieves optimum learning with one treatment and a second group differing on that aptitude or trait reveals a greater achievement with the other treatment, the instructional setting should provide for differences in learner abilities.

OBJECTIVE(S): Primary Reduced Phrase (CTP)

Cluster 1 (learning)

differences: learning (cognitive)
differences: learning (affective)
differences: learning (psychomotor)
learning
psychology (learning)
learner
needs (learner)

Statement Group 1

Differences among affective, cognitive, and psychomotor learning demand that media characteristics be matched with learning objectives for maximum effectiveness in learning.

Given an understanding of basic learning theory, objectives can be originated and sequenced for easier learning using the principles involved in learning psychology.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

For sophistication in instruction, the communicator must first determine the appropriate perceptual stimuli (sensory experience) which meet learner needs and objectives before determining which media and channels to use.

Cluster 2 (components of instruction)

output
input
visibility: process (learning)
capabilities (assessment)
result: sequence (instructional)

Statement Group 2

Accountability is a management concept or policy which involves agreeing upon objectives, deciding upon the input to achieve the objectives, and measuring the output to see the degree to which the objectives have been met.

The ability to increase the visibility of the learning process and to combine humane and technological concerns through systems planning could increase our capability to better identify and monitor the accomplishing of system, program, student and enabling objectives.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

Objectives must be defined relative to full human needs and not limited by assessment capabilities.

PROCESS(S): Primary Reduced Phrase (CTP)

Cluster 1 (learning)

learning
styles (learning)
change: capability (human)
experience (educational)
formation (concept)

Statement Group 1

Learning is a change in human disposition or capability which can be retained and which is not simply ascribable to the process of growth.

Concept formation is the process through which we develop learning styles.

As an ideal, the active process of organizing facts and ideas is an ever present educational experience.

Cluster 2 (components of instructional materials production)

instruction (pre-designed)
production: instruction
implementation: instruction
extension: principles: instruction (programmed)
information: development: strategy (instructional)
information: development: design: medium (instructional)

Statement Group 2

The instructional systems development process is a logical extension and combination of the principles of programmed instruction and the systems engineering concepts used in the development of complex defense and space systems.

Formative evaluation is an on-going process that seeks information during the development of an educational entity (e.g., curriculum, instructional strategy or design of an instructional medium), whereas summative evaluation seeks information about the merits and shortcomings of the completed entity.

Pre-designed instruction follows a systematic process.

The production and implementation of validated instruction is aided by a systematic process of planning, design, development, evaluation, and implementation.

Cluster 4 (systems)

application: concept (systems)
analysis (system)
design (system)
development (system)
management (system)
extension: principles: concept (systems)
combination: principles: concept (systems)
development: systems (defense)
development: systems (space)

Statement Group 4

The instructional systems development process is a logical extension and combination of the principles of programmed instruction and the systems engineering concepts used in the development of complex defense and space systems.

Application of the systems concept involves at least three phases, anywhere and anyplace: (1) system analysis and design, which is primarily an analytical process; (2) system development, which is accomplished through the tedious and demanding process of research and development; and (3) system management, which is primarily an administrative task and inevitably done very badly in institutional education from behind the well-guarded desks of the principal, the superintendent, or the vice-president of academic affairs.

RESEARCH: Primary Reduced Phrase (CTP)

Cluster 2 (Media/Technology)

media
presentation (stimulus)
cues (perceptual)
basis: materials (instructional)
understanding: systems (visual)
understanding: systems (perceptual)
understanding: systems (audio)
technology (instructional)
instruction (computerized)
mix: instruction (programmed)
effects (universal): structure (message)
effects (universal): attributes (media)

Statement Group 2

Research in behavioral processes which contributes to theories of learning, performance, and instruction can contribute to a rational basis for planning, developing, and implementing instructional programs or materials.

Research needs to be undertaken into the factors that start to answer why rather than purely describe a situation, e.g., what perceptual cues are important for learning and how they can be utilized.

Media is concerned with stimulus presentation, thus media research should be concerned with the impact of various manipulations of stimulus presentation on the psychological variables of cognition which govern learning.

The understanding of human visual perceptual and audio perceptual systems will contribute to research on human information processing systems.

We need valid research which will develop useful indicators to aid in determining the appropriate mix of one-to-one personal contact/programmed instruction with access to mentor/computerized instruction lacking all but minimum attention from mentor.

Instructional technology must recognize that universal effects of media attributes, instructional management systems, message structure, learner pre-training are most usefully and perhaps ultimately restricted to research oriented toward the short-term "proximal" laws.

TECHNOLOGY(S): Primary Reduced Phrase (CTP)

Cluster 1 (components of communications)

theory (communication)
communications (educational)
effects (universal): structure (message)
techniques: systems (message)

Statement Group 1

Technologies of instruction are the techniques of designing specific message systems.

Instructional technology must recognize that universal effects of media attributes, instructional management systems, message structure, learner pre-training are most usefully and perhaps ultimately restricted to research oriented toward the short-term "proximal" laws.

Communication theory, as applied to educational technology, has been strongly influenced by information theory.

Meaningful learning is a concept that is congruent with educational communications and technology.

Cluster 2 (systems)

effects (universal): systems (instructional)
effects (universal): systems (management)
approach (systematic): instruction (effective)
approach (systematic): instruction (efficient)
totality: process (instructional)

Statement Group 2

Careful measurement to the extent it is possible, and an understanding of the limitations inherent in current technology for the measurement of human performance, is essential in a systematic approach to developing effective and efficient instruction.

Instructional technology is the totality of the instructional process and related support services (e.g., data processing).

Instructional technology must recognize that universal effects of media attributes, instructional management systems, message structure, learner pre-training are most usefully and perhaps ultimately restricted to research oriented toward the short-term "proximal" laws.

THEORY(S): Primary Reduced Phrase (CTP)

Cluster 2 (learner characteristics)

strengths (learners)
weaknesses (learners)
characteristics (learner)
learners
abilities
attitudes
orientation (psychological)

Statement Group 2

Modern teaching/learning theory is dominated by a psychological (as opposed to logical) orientation.

Learning and learning environment consist of the knowledge, abilities and attitudes associated with the curriculum; learning theories as they relate to human growth and behavior; and strategies for teaching and learning within the life-space of the individual.

The theory of instruction requires setting the instructional goals, analyzing learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally evaluating outcomes relative to goals and learners.

DATA/FACT/INFORMATION: Primary Reduced Phrase (CT/CTP)

Cluster 2 (evaluation)

feedback
evaluation (program)
evaluation (program)
evaluation (formative)
evaluation (summative)

Statement Group 2

Program evaluation incorporates all descriptions and inferential data.

Feedback provides data which can be used in program evaluation.

Formative evaluation is an on-going process that seeks information during the development of an educational entity (e.g., curriculum, instructional strategy or design of an instructional medium), whereas summative evaluation seeks information about the merits and short-comings of the completed entity.

INSTRUCTION: Primary Reduced Phrase (CT/CTP)

Cluster 1 (learning)

learning
learning
learning
learning
job (student)
interaction: learner: task (goal-oriented)
purpose: learning
complex: differences (individual)
learner
students
aptitudes

Statement Group 1

Instruction is planned for the purpose of learning.

Instruction is the interaction of a teacher (or mediated form of a teacher) and a learner in a purposive, goal-oriented task intended to facilitate learning.

Learning and instruction are opposite sides of the same coin: the student's job is to learn; the teacher's job (or instructional personnel of any sort) is to create situations and experiences in which the desired learning takes place.

The closer instruction approaches realism, the more likely will be effective learning.

The complex of individual differences each learner contains will effect directly responses to given forms of messages used for instruction.

Visual instruction and visual literacy are terms which imply aptitude-treatment interaction for designs for learning in order to determine how specific students respond and interact to specific forms of instruction employing visual designs.

Competency-based instruction can be interpreted to cover those programs which compensate for specific aptitudes and properly interacts with them.

Organized, planned, instructional development, based upon job task data analysis, provides for efficient instruction and effective learning.

Cluster 4 (instructional development)

development: technology (inquiry)
development (organized)
development (planned)
development (instructional)

Statement Group 4

Theory building seems dependent very largely if not predominantly upon the development of inquiry technology oriented to the short-term contrived-designed-artificial phenomena that defines instruction.

Organized, planned, instructional development based upon job task data analysis, provides for efficient instruction and effective learning.

LEARNER(S)/STUDENT(S): Primary Reduced Phrase (CT/CT)

Cluster 1 (learner characteristics)

behavior
characteristics (learner)
readiness
complex: differences (individual)
strengths (learners)
weaknesses (learners)

Statement Group 1

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

Theory of instruction requires setting the instructional goals, analyzing learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally evaluating outcomes relative to goals and learners.

The complex of individual differences each learner contains will affect directly responses to given forms of messages used for instruction.

Learners differ significantly in their readiness to receive the same information presented through different media or in different learning group formats.

Cluster 3 (components of instructional development)

instruction (visual)
forms: instruction
form (message)
formats: learning
mode: instruction
method: instruction
instruction
program (instructional)
goal: instruction
situation (learning)
teaching
theory: instruction
goals (instructional)
objectives
objective (behavioral)
result: sequence (instructional)

Statement Group 3

Theory of instruction requires setting the instructional goals, analyzing learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally evaluating outcomes relative to goals and learners.

It [the learning environment] has a bearing on the way a learning situation will be perceived by the student (learner) and thus effects the teaching and approach that will be most effective.

A behavioral objective is simply a statement regarding the behavior expected of a learner as a result of an instructional sequence.

The goal of instruction is to maximize the efficiency with which all students achieve specified objectives.

A set of techniques, sometimes called "brainstorming," can be organized and designed into an instructional program so as to provide the learner with information generating and evaluating skills, applicable to a wide range of content areas.

The complex of individual differences each learner contains will effect directly responses to given forms of messages used for instruction.

Meaningful learning assumes the learner can positively identify with the mode and method of instruction.

Learners differ significantly in their readiness to receive the same information presented through different media or in different learning group formats.

Visual instruction and visual literacy are terms which imply aptitude-treatment interaction for designs for learning in order to determine how specific students respond and interact to specific forms of instruction employing visual designs.

Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.

Cluster 4 (components of communications)

systems (conveyance): forms (message)
channels
media
relationship: forms (media)

Statement Group 4

Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.

Learners differ significantly in their readiness to receive the same information presented through different media or in different learning group formats.

The relationship between information processing theories and media forms will assist in the development of more realistic differences between the processes required of the viewer or student.

MATERIAL(S): Primary Reduced Phrase (CT/CTP)

Cluster 2 (components of instruction)

goals (instructional)
strategies (instructional)
outcomes
competency (subject)
information: people
learning: content

Statement Group 2

The operational principle [of learning] is to move information and learning materials to the people and reduce as much as possible the travel of people to the places where learning materials originate or are displayed.

The use of cognitive style may enable an instructional designer to define and produce instructional materials which match a learner's perceptual and cognitive patterns, thus facilitating learning of the content so designed.

The teacher must be well prepared professionally in order to teach the materials, i.e., subject competency must exist.

Theory of instruction requires setting the instructional goals, analyzing the learners' strengths and weaknesses, employing materials and instructional strategies relative to goals and learner characteristics, and finally evaluating outcomes relative to goals and learners.

MEDIUM(S) AND COMBINED LIST: Primary Reduced Phrase (CT/CTP)

Cluster 1 (learner)

needs (learner)
learners
learner
needs: learners

Statement Group 1

Message forms (media) for instruction should fit the unique needs of learners and objectives.

Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.

Learners differ significantly in their readiness to receive the same information presented through different media or in different learning group formats.

For sophistication in instruction, the communicator must first determine the appropriate perceptual stimuli (sensory experience) which meet learner needs and objectives before determining which media and channels to use.

Cluster 3 (components of communications)

stimuli (perceptual)
experience (sensory)
channels
channels
means: experience (human)
presentation (stimulus)
cues (sensory)
channel (verbal)

Statement Group 3

Because of the physiological limitations in humans to process information (sensory input), except in linear fashion, multi-media presentations, gestalt, and zap exposures to sensory overload interferes with learning.

The verbal channel must have preference over pictures except in rare instances.

Presentation media which present sensory cues not similar to those associated with the learning task will be most effective in promoting transfer from the learning environment to the real-world environment.

Media is concerned with stimulus presentation, thus media research should be concerned with the impact of various manipulations of stimulus presentation on the psychological variables of cognition which govern learning.

For sophistication in instruction, the communicator must first determine the appropriate perceptual stimuli (sensory experience) which meet learner needs and objectives before determining which media and channels to use.

Channels (conveyance systems for message forms) influence in direct and subtle ways the message form received by the learner.