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ABSTRACT

The relationship between communication theory and media research must be reciprocal. Without some acknowledgement of a commonality with specific aspects of communication theory, media research efforts will continue to stagnate and produce uninterpretable or extremely limited observations. On the other hand, media researchers' commitment to the artificial constraints imposed by particular disciplines or applied fields has failed to produce the consistency, generality, and commonality needed for the development of a comprehensive instructional communication model. Such a model would of necessity be eclectic--an extrapolation from a broad spectrum of models, paradigms, classification systems, and hierarchies. Proceeding within such a theoretical framework, research integration of a statistical nature presents an opportunity to cross the artificial boundaries of disciplines and applied fields to produce information of greater generalizability. It also has the advantage of upgrading the vague summaries generic to many narrative reviews. It seems reasonable to assume that such integrations of communication research in the behavioral sciences could result in one or more axiomatic theories for instruction. Until these tasks have been accomplished, however, research on instructional media will still be based largely on "implusive reckoning." (FL)

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INTEGRATING COMMUNICATION RESEARCH: THEORY OR "IMPULSIVE RECKONING?"

Considerable concern has been generated in many quarters about the lack of interrelations between communication and educational technology research (Hill, 1978). Over the years, this separation of people and ideas has increased. At least a partial explanation lies in the fact that, on the one hand, communication researchers have failed to come to consensus on a single theory of communication while, on the other hand, educational technology researchers have ignored and/or failed to consider the common elements and processes that do exist within most of the popular models. As a result, various researchers have not employed either the framework or the language of their predecessors or their peers. Both camps have reached a period of decreasing gains with permutations of past and current atheoretical research.

If we are going to make more than fragmentary contributions through research, we need a concerted effort on the parts of both communication and educational technology researchers to reestablish the theoretical links that once were obvious. Trends toward specialization have, to a large extent, obscured the theoretical commonalities which do exist among researchers in many applied fields. A common knowledge base derived from integrations of these diverse research efforts will certainly be more fruitful, as a foundation for future research, than the "shotgun" approach currently in use.

Communication Diversity Hinders Theoretical Development

As early as 1951, Ruesch hinted at the possibility that communication may be the common denominator joining the various fields of social science. Similarly, Schramm (1963) described communication as perhaps the fundamental social process, and one of the "busiest crossroads in the study of human behavior" (p. 1). More specifically, Thayer (1968) enumerated fifteen areas concerned with communication to demonstrate the diversity of interest. This variety of interests has given rise to a vast number of scientific studies (DeFleur and Larsen, 1958). Knower (1966) identified more than twenty academic disciplines involved in human interaction research. In this same vein, Mortensen (1972) described communication efforts in the physical sciences (in the area of cybernetics, information theory, and general systems theory) and in the social sciences (through the work of anthropologists, psychologists, sociologists, educators, speech specialists, and mass communicators). Blake and Haroldsen (1975) specified that communication research has covered a spectrum of "humanistic, critical, philosophic, historical, and scientific studies" (p. 145).

One logical assumption that can be derived from these assessments is that research emanating from so many areas has contributed to what Mortensen (1972) termed the "unsettled and amorphous" nature of the communication field (p. 21). Boundaries for the field of communication, he asserted, still are not established, nor are initial principles yet agreed upon. This situation, he concluded, is complicated further by the lack of theoretical integration.

Not surprisingly, one of the causes of the difficulty in achieving this integration is the lack of agreement over the definition of the concept of communication. As an abstract concept, the word possesses multiple legitimate meanings. According to Mortensen (1972), "At times *communication* appears to be a catch-all word" (p. 21). As Dance (1970) observed, the concept one uses will determine the area of desired investigation. This same concept will also direct efforts toward theoretical development. Dance (1970) identified ninety-five definitions of the term communication with the intent of synthesizing these components into a single definition of the concept of communication. He concluded, however, that such synthesis is unlikely and probably undesirable. As he stated, "The looseness of the concept of communication is reflected in the looseness of the field or fields identified with the study of communication. In many ways such diversity is enriching . . ." (p. 210). While such looseness may cause divisiveness, Dance believed that a single rigid definition would be overly restrictive.

Others, however, found this diversity less praiseworthy. Westley and MacLean (1974), for example, declared that "One finds today a jungle of unrelated concepts and systems of concepts on the one hand and a mass of undigested, often sterile empirical data on the other" (p. 336). As a consequence, there is not as yet a synthesized communication theory, and the prospects for such a theory are not promising (Mortensen, 1972). We find it both disheartening and counterproductive that the researchers in an area of study so fundamental and pervasive as communication have not derived a common datum plane upon which comparisons of diverse research efforts can be based.

Media Research Inadequacies

Considering the extent of the disciplines involved in communication research, it is not surprising that some investigations have focused on practical concerns and others on theoretical issues. As an applied field of communication, educational technology has concerned itself with the specific issues of how communications technology can be practically applied to the instructional process. This rather narrow focus has engendered a large body of media research virtually devoid of theoretical roots. One can survey the media research in vain to find indications of ties to communication theory. Thus, it is hardly unusual that a summarization of media research inadequacies remains a standard feature of literature reviews.

A serious reader of media research is led inexorably to the conclusion that a considerable amount of misdirected energy has been expended over a lengthy time span to establish a data base of questionable value. One may even conclude, albeit reluctantly, that media research efforts have had, on the whole, inconsequential value for either theory or practice. The comments which follow are both sufficiently illustrative and discouraging.

In 1968, Snow and Salomon remarked that "virtually nothing is known . . . about the teaching effectiveness of instructional media" (p. 341). But perhaps the most brutally frank assessment of media research was offered by Hawkridge (1973):

> The fact is that instructional researchers and designers have not provided even the foundations for constructing strong practical procedures for selecting media appropriate

> to given learning tasks. If there has been British work in this area, I have been unable to discover it . . . . In the United States, over 2000 media studies have not yielded the answers we need. (p. 1)

One source of this frustration lies in the fact that research *with*, as opposed to research *on* media, has been the rule rather than the exception (Salomon, 1970). Researchers repeatedly have treated a given medium as a whole entity, as in comparison studies of film versus television, in an attempt to support the premise that the media could indeed teach. Fleming (1970) recognized that such gross comparisons yielded meaningless data since they masked considerably more variability than they explained. In 1977, Schramm described this macro quality as perhaps the most regrettable feature of the long list of instructional media experiments. In addition, many media researchers have equated communication effectiveness with technical efficiency. Thus, variables related to presentation techniques (e.g., audio fidelity, camera angles) have been researched extensively. However, this literature was so vast, the findings so varied, and the specific concerns so narrow, that Klapper (1960) felt a general summary would be exceedingly difficult and time consuming.

ATI Results Tainted by Complexity

During the last ten years, we have witnessed a gradually decreasing emphasis on gross media studies comparing one instructional method with another. The recognition that these studies masked more "truth" than they uncovered prompted repeated calls for more exacting media research

to investigate the interaction between learner aptitudes and media. The most recently utilized methodology for the latter type of study has been Trait-Treatment Interaction (TTI), or synonomously, Aptitude-Treatment Interaction (ATI). For purposes of ATI research, aptitudes or traits have been defined broadly enough to include the psychological, sociological, and physiological characteristics of learners. Cronbach and Snow (1977) suggested that any aspect of an individual which may be useful in predicting instructional responses should be considered an "aptitude." Treatments have been defined in a similarly broad fashion to include variations among most experimentally manipulable aspects of the media or the learner.

The educational community has adopted many instructional and programmatic practices geared to individual differences. The concerted research efforts to locate educationally relevant ATI's is, in part, an outgrowth of those efforts. It is intellectually difficult to deny that ATI's exist. To do so is tantamount to asserting that the instruction which works best for one group of students is therefore best for all students (Cronbach and Snow, 1977).

But, paradoxically, it is the firm belief in human individuality and instructional diversity which has so complicated ATI research. As Cronbach (1975) stated, "Once we attend to interactions, we enter a hall of mirrors which extends to infinity . . ." (p. 119). The greatest difficulty ATI researchers have faced is the isolation of those aptitudes and treatment conditions, from an unknown universe of differences, which reliably interact with particular instructional treatments

so as to result in predictable learning outcomes. Thus, ATI researchers have had a veritable field day in devising researchable combinations. Constructs may pair up to form virtually limitless ATI hypotheses (Cronbach and Snow, 1977). The result has been a bewildering array of studies with relatively few threads of commonality, prompting every reviewer of ATI literature we have encountered to paint a depressingly familiar picture of ineffectiveness (Bracht, 1970; Cronbach and Snow, 1977; Dwyer, 1978; Heidt, 1977; and Parkhurst, 1975).

Tunnel-Vision Media Research

Perhaps the single most pervasive shortcoming of individual media research efforts is the lack of inclusiveness, i.e., collective inattention to the totality of the learning environment. For example, the term *Aptitude-Treatment Interaction* itself denotes an overly simplistic two-dimensional conception of instructional communication environments and has perhaps unrealistically delimited the variables of instruction. Media research has *separately* covered a spectrum of variables including learners, teachers, treatment characteristics, environmental or situational conditions, resource characteristics, and factors related to the instructional message or task. If such research is to be integrated systematically toward meaningful conclusions, some semblance of order must be imposed on this mass of research conclusions. To date, research has been conducted from the researcher's conception of fundamental combinations of attributes. Considering the unproductive history of media research, it seems appropriate to reexamine diverse media research directions from a new perspective. From this

perspective, a sorely needed sense of purpose and direction may emerge.

Media research exhibits an unfamiliarity with the major thrusts of research in other disciplines and applied fields. All too frequently, media researchers have operated from a tunnel-vision view which has led to narrowly conceived research hypotheses. This, in turn, has resulted in explanations of data in terms which either sustained or modified the philosophic or theoretical bent of a particular researcher. These shortcomings have culminated in the failure by many individual media researchers to consider variables and relationships that are treated by colleagues from other applied fields of communications and from other disciplines. A merger of these research efforts and an acknowledgement of similar concerns would undoubtedly result in expanded knowledge of the instructional phenomenon, and assist in the redirection of media research efforts.

Media Research Needs Theoretical Integration

The most pressing initial need is to integrate past media research findings along theoretical lines. We have been unable to locate reviews which do more than merely summarize media research in narrative fashion. The reviews typically manifest conceptual and methodological problems noted by Feldman (1971), Glass (1976, 1977), Jackson (1978), and Light and Smith (1971). Of greater pertinence, however, is that such research integration efforts have failed in the same fashion as the original individual research efforts; no attempt has been made to place these findings within the larger context of communication theory. For example, media research reviews typically have dealt with

studies undertaken with particular items of hardware (e.g., film, television), and/or with specific methodologies (e.g., programmed instruction), and/or with such variables as specific resource attributes (e.g., color, motion) and/or learner attributes (e.g., sensory channels, age, sex, I.Q.).

Similarly, attempts have been made to integrate the fragmentary ATI results . . . with little success. Allen (1975) concluded that generalizing from the available results was virtually impossible. The similarity of Allen's comments to those of Hawkridge was striking: "There is little definitive evidence from the aptitude-treatment interaction research that points conclusively to the employment of practices that might guide the selection of the more general instructional strategies, much less lead to the design of specific instructional media" (p. 139). Dwyer (1978) and Parkhurst (1975) also have noted the limited usefulness and meaningfulness of ATI research to date. In the summary of what is undoubtedly the seminal work for research on interactions, Cronbach and Snow (1977) concluded that "No Aptitude X Treatment interactions are so well confirmed that they can be used as guides to instruction" (p. 492).

Parallel Recognition of Communication Complexity

The evolving recognition by media researchers of the true intricacies of instructional communication paralleled a similar evolution by communication theorists. The difficulties faced by media researchers in searching for ATI's is essentially a microcosm, or subset, of the problems confronting communication research in general. Klapper's (1960) description of the difficulties involved in assessing communica-

tion effectiveness is strikingly similar to the prior analysis of aptitudes and treatments: "Almost every aspect of the life of the audience member seems susceptible of relation to the process of communication effect" (p. 4). The notion that communication is a complex process has been emphasized by a variety of sources, some involved in model development and others not so involved.

The Shannon-Weaver (1949) model and the other non-process models it spawned have been criticized by many for the mechanistic way they represent the phenomenon of communication (Fearing, 1962; Klapper, 1960; DeFleur and Larsen, 1958). The current widespread acceptance of the process viewpoint of communication has produced a number of models which serve to highlight the complexity of communication by focusing more fully on the mediational factors affecting the communicative act. Accordingly, Mueller (1972) rejected the simple stimulus-response model as not sufficiently descriptive. He advised considering encoding possibilities on two levels: a primary level of physical sensation, and a secondary level where these same sensations are reconstructed in our minds.

Carpenter (1957) stated that the response to a communication could be expected to differ greatly from the initial stimuli since an individual's entire relevant life history operated as a filter between stimulus and response. Mortensen (1972) also described communication as a total experience in which one's entire "dynamic" as a person is involved. An implication of this idea, he continued, is that communicative behavior is contingent upon the psychological and sociological factors which determine individual behavior in general. The stimulus-

response paradigm ignores individual capability to "select, amplify, and manipulate" incoming stimuli (p. 16). Mortensen further contended that a communication cannot be considered without reference to the *situational geography* in which it occurs. By this he was referring to the manner in which the setting (immediate physical environment) imposes meaning on messages.

These analyses of communication complexity may seem almost embarrassingly elementary, and yet so much media research has been undertaken and results interpreted without reference to these mediating factors that one may rightly question how self-evident they truly are. We maintain that the lack of any single overriding communication theory and the current awareness of the complexities of the communication process should not deter efforts to integrate media research. Certainly there is no dearth of communication models for initiating this process. It would be premature at this juncture to suggest any one particular model as the sought-for exemplar. Such a proposition is really not needed, since most communication models do display certain essential commonalities which can be directly related to instructional communication.

Application of Communication Models to Instruction

The Shannon-Weaver (1949) model, solely because of its renown, suffices for illustrating the potential applicability of certain aspects of communication models to the applied field of instructional communication. In fact, the compatibility of the concepts within the Shannon-Weaver model to social communication has already been noted (Mortensen,

1972). Deutschmann, Barrow and McMillan (1961) considered this model directly applicable to the classroom:

> The teacher can be equated with the communication-encoder; the students with the decoder-receiver. The total complex of stimuli available to the receivers is the message plus the noise. In most cases, this stimulation probably exceeds the receivers' capacity to decode. That part of the stimulation--including lecture, audiovisual materials, and discussion--which is relevant to the instructor's purposes, we may designate as message. That part of the stimulation which is irrelevant, we may call noise (p. 263).

Regardless of the specifics of particular models, communication theorists do concur in the belief that certain aspects of human behavior cannot be studied adequately if isolated from all other aspects. The only way to reach an understanding of the process of communication is to relate all of the variables to one another. Although it may be necessary to analyze certain components separately (e.g., sources, channels, messages), it must be borne in mind that the whole structure depends on the interrelationship of the parts, and that such separate analyses are a distortion of the true process (Berlo, 1960). Berlo further noted that a comparison of the process models generally indicates a great deal of similarity, despite semantic differences in terms and the inclusion or deletion of an element or two. In introducing his model, Berlo stated that certain ingredients were essential to communication:

> Whenever we talk about communication in terms of one person, two persons, or an institutional network, the functions labeled as source, encoder, decoder, and receiver have to be performed. Messages always are involved and must exist in some channel. How they go together, in what order, and with what kinds of interrelationships depends on the situation, the nature of the specific processes under study, the dynamic involved (p. 38).

It takes no great leap of the imagination to relate the essential variables Berlo described to the teacher, the learner, the task, and the resources, which interact to form an instructional environment.

Psychological, Sociological, and Physiological Dimensions Derived From A Holistic Approach

It should not come as a great revelation to media researchers that, in addition to the similarities of elements in communication and in instructional situations, the process approach to the analysis of communication parallels the interactions which occur in the instructional setting. Thus, an additional value of communication models to media research integration lies in their holistic approach to communication situations. The theorist, as opposed to the researcher, does not focus on the specifics of one or two instructional variables. The traditional distaste of the practitioner for theory may thus appear paradoxical when one considers that the holistic approach of the theorist is similarly characteristic of the "effective" instructor, but is philosophically worlds apart from most instructional research efforts.

Intuitively, many instructors manage to derive an optimal blend of personal style, learner and resource characteristics, and task requirements through a consideration of psychological, sociological, and physiological factors. Undeniably, a considerable amount of classroom instruction, devoid of experimental controls or constraints, frequently produces learning of practical significance. Instructional researchers would do well to adopt, adapt, and apply the eclectic approaches of "successful" instructors and of communication theorists to the design

of instructional research. Thus far this has not been done.

The instructional research literature also has been divided by disciplines, and this separation has been more debilitating than illuminating. This research is not so simply categorized. The variables examined and the circumstances surrounding their investigation frequently transcend artificial boundaries. It would seem productive to presume that there is more theoretical commonality than exclusivity in the interests of assorted researchers and practitioners. Regardless of individual research efforts, collectively the research concerns have paralleled the considerations of the "effective" instructor who intuitively structures his teaching based on his own psychological, sociological, and physiological dimensions, as well as these same dimensions of the learner, the task, and the resources.

If learning is the ultimate product of effective instructional communication, then an effective instructional environment is the product of the interaction within, between, and among the teacher, the learner, the task, and the resources. It follows then that an appropriate research model could be directly related to the psychological, sociological, and physiological dimensions of the teacher, the learner, the task and the resources. While the dimensions may not be mutually exclusive, this deficiency is minimized by viewing instruction as a dynamic process. Thus, while the individual variables play an integral part, they are subordinate to the unique psychological, sociological, and physiological relationships within, between, and among the variables. While it may seem paradoxical to deplore one set of artificial boundaries and impose another, this tentative trichotomy may prove functional since

it is based more on theory and less on convention.

A brief explanation, not intended to be all inclusive, may help clarify this trichotomy. Functional and/or differential psychological research has dealt primarily with intellectual abilities and attitudes, as well as with the relationships among stimuli, mediating covert behaviors, and observable responses. Observational and/or sociological research has emphasized the humanistic, cultural, ethical, ethnic, and consistency needs of individuals or groups. This area also encompasses modeling behaviors, selective perception, and instructional cognitive styles, which may be culturally or socially learned preference systems. Within the area of physiological research lies the subjective research on perception. The biological bases of knowledge contain the roots of this major area. Research in this dimension has dealt with the developmental characteristics of individuals as they interact, through the sensory channels, with the instructional environment.

We maintain that functional relationships between stimuli and responses are best predicted from information about the intermediary processes that occur within the individual. In order to provide such functional relationships, communication problems involving syntactics (interrelations of signs), semantics (meanings attached to signs), and pragmatics (human reactions to signs) must be minimal. Hence, the objective form (physiological) and subjective meaning (sociological) of the learning task must yield a functional distinctiveness (psychological) in terms of the sensory information to be extracted by the learner.

Research Integration Using Essential Communication Processes

Media research integration proceeding from this conceptual level requires not only the isolation of principal components (learner, teacher, task, and resources) and their dimensions (psychological, sociological, and physiological), but of the essential processes as well. Together, these variables can serve as common denominators of research interests in a variety of disciplines. Moreover, theoretical development would be advanced if these elements were either implicit or explicit features of most, if not all, communication models. Salomon (1974), describing the potential elements in a taxonomy of media attributes, discoursed on the relationship of symbol systems (e.g., digital, iconic, analogue), coding elements (e.g., dimensionality, iconicity), secondary coding systems (e.g., editing, sequencing) and such additional features as complexity, redundancy, or ambiguity. Schramm (1977), in reviewing Salomon's erudite analysis, ruefully admitted that media researchers have "only the foggiest of ideas about this area that Salomon is opening up" (p. 87). These central processes that Salomon refers to are hardly news to communication theorists and would serve as additional commonalities for integrating the efforts of communication researchers in diverse fields.

The essential processes of codification and sign usage are but two examples of key elements whose fundamental importance has been widely recognized. Littlejohn (1978), for example, described coding as a fundamental concern in the study of communication and concluded that "essentially every theoretical approach to communication takes place through the use of signs" (p. 80). Salomon (1974) has stated that one

of the key steps in designing instructional media is the selection of a symbolic coding system which is "isomorphic . . . to the learner's symbolic mode of thinking" (p. 401). According to Conway (1967), the translation of information from one mode to another (coding) is a significant empirical problem. In sum, sign/symbol usage and codification are but two examples of elements which provide a common thread through diverse research efforts.

Summary

The relationship between theory and research must be reciprocal. Each should serve and strengthen the other. Without some acknowledgement of a commonality with specific aspects of communication theory, media research efforts will continue to stagnate and produce uninterpretable or extremely limited observations. The need is imminent for a reflection on previous media research efforts and an integration of findings along theoretical lines.

Media researchers' commitment to the artificial constraints imposed by particular disciplines or applied fields has failed to produce the consistency, generality, and commonality needed for the development of a comprehensive instructional communication model. It may prove beneficial to use the relationships we have postulated as the basis of such a model. This model would be necessarily eclectic--an extrapolation from a broad spectrum of models, paradigms, classification systems, and hierarchies. In this way we may be able to identify common denominators of the current literature.

Research integration efforts need not wait for such full-blown models to be developed. We feel that the elements of commonality

which have thus far been identified are sufficient for media research integration studies to begin.

Proceeding within the theoretical framework we are proposing, research integration of a statistical nature, as described by Glass (1977), presents an opportunity to cross the artificial boundaries of disciplines and applied fields to produce information of greater generalizability; it also has the added advantage of upgrading the vague summarizations generic to many narrative reviews. The increased specificity of information resulting from meta-analytic reviews could be of great assistance in the refinement of past and future instructional communication models by generating more precise hypotheses for empirical validation.

It seems reasonable to assume that such integrations of communication research in the behavioral sciences could result in one or more axiomatic theories for instruction. Until these tasks have been accomplished, research on instructional media will still be based, to an unfortunate extent, on "impulsive reckoning."

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