Motivation and Instructional Design: A Theoretical Perspective

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Lack of Attention to Motivation

We have not given adequate systematic attention to the problem of motivation in instructional theory and technology, to the understanding of motivation in individual learners, or to the development of a technology for influencing motivation (Cooley & Lohnes, 1976; Cronbach & Snow, 1976). We know, as a rule of thumb, that we *should* introduce novelty, uncertainty, or a sense of mystery at the beginning of a program to elicit attention and, it is hoped, enthusiasm, and we know that we *should* use reinforcement to help sustain desirable changes in behavior, but neither of these principles constitutes an adequate understanding of motivation. The purpose of this paper is to present a theoretical approach to understanding motivation in relation to other factors that influence learning and the design of instruction. In this context, several illustrative research studies are reviewed along with an introduction to a systematic process of influencing motivation. This presentation is not exhaustive, but serves as an introduction to the approach, and as a basis for subsequent elaborations of the issues and techniques based on this approach.[1]

The paper begins from an historical perspective with two major influences in instructional technology that have preceded our current concern with motivation. The second portion of the paper introduces a process, or systems-type, theory that describes the relationship among the components of individual motivation, performance, and the design of instruction. The theory also provides the basis for incorporating and expanding several prescriptive theories of instructional design and management, and the development of additional prescriptive approaches where they are now lacking. Following the discussion of the content and characteristics of the theory is a brief review of related research studies and an approach to systematically influencing motivation.

Behavioral Influence

Historically, instructional technology has had a strong emphasis on the applications of behavioral psychology to instructional design and management. This approach resulted in the design and use of many types of contingency management systems (see Snelbecker, 1974, for a review) including programed instruction, token economies, contingency contracting, and the personalized system of instruction (Keller, 1968). The basic assumption in this approach is that behavior is controlled by its consequences, and the emphasis is on organizing content to minimize errors in a context of active responding together with the use of effective reinforcement schedules (Markle, 1969; Skinner, 1968). We can illustrate this approach (Figure 1) as the joint influence of an individual's actual performance, and the contingency management system in use on the consequences that are obtained.

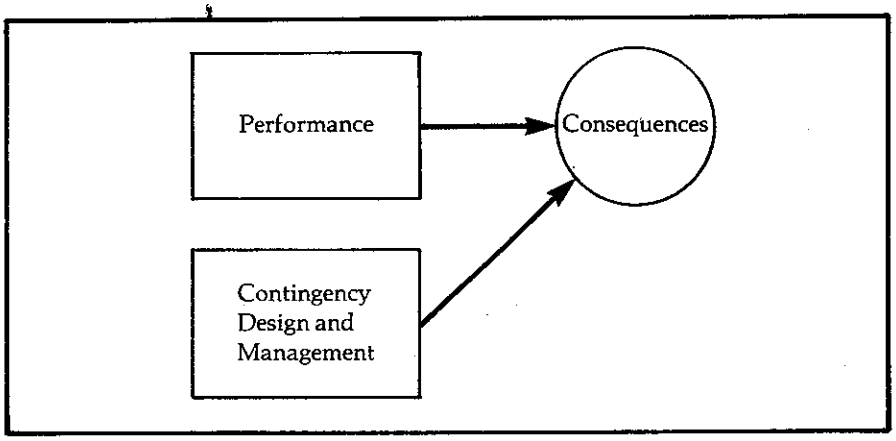

Figure 1. Influence of consequences on performance.

Cognitive and Instructional Theory Influence

While the influence of behavioral theory on instructional technology has been strong and productive, it was soon recognized that these assumptions were not sufficient. Many of the contingency management systems, even those produced by the behaviorists, contained implicit assumptions about individual abilities and the characteristics of human information processing. For example, designers of programed instruction found that for some learners retention was influenced by the method of organizing content, and not simply by the schedule of reinforcement. Consequently, our field has also drawn heavily from the general field of cognitive psychology, including information processing theory, individual difference theory, and communications theory in order to design and manage the instructional materials from which learning takes place.

This focus on the stimulus characteristics that precede effective performance is illustrated (Figure 2) by the interaction of individual abilities, skills, and knowledge with the learning design and management approach that is utilized. It is reflected in the work of persons such as Gagné (1977), Merrill (1975), Reigeluth (Reigeluth & Merrill, 1979), and Dwyer (1978), and by the aptitude-treatment-interaction research (Cronbach & Snow, 1976). In each of these programs of research, a primary goal is

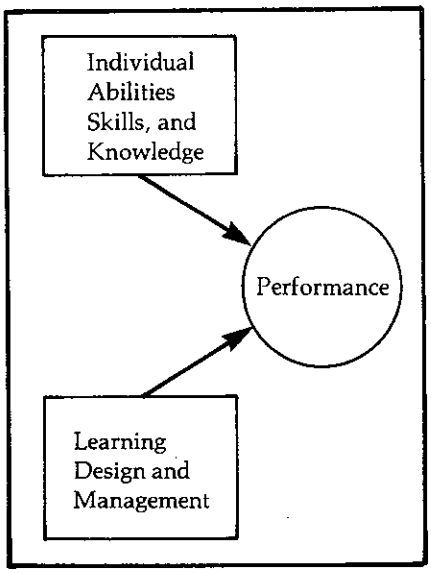

Figure 2. Influence of stimulus conditions on performance.

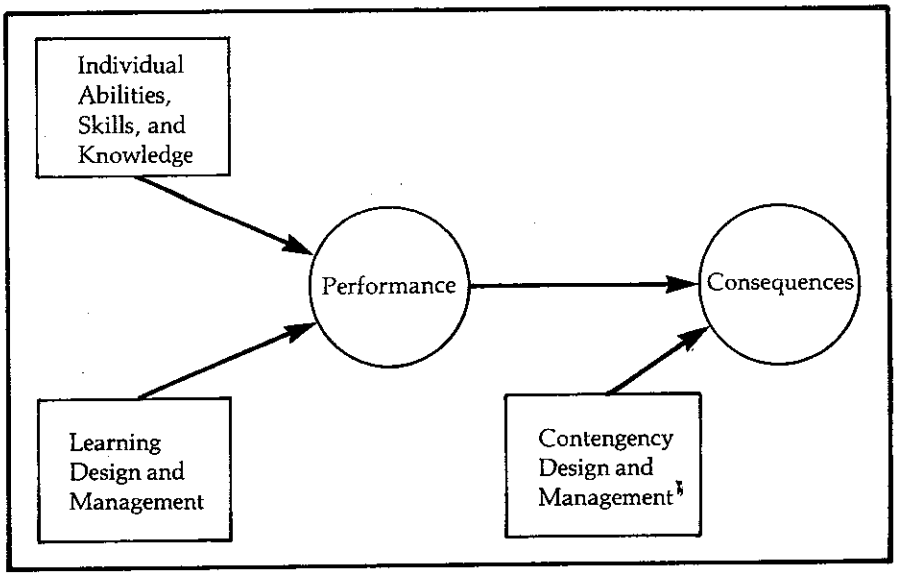

Figure 3. Joint influence of stimulus conditions and consequences on performance.

to discover and explain the characteristics of effective learning design approaches in relation to the aptitudes or cognitive styles of learners.

Combined Influences

Speaking in broad terms, we can say that our field now incorporates principles and practices derived from behavioral psychology and cognitive learning psychology. The influence of behavioral psychology has been primarily on controlling outcomes to influence the type and rate of response. This has improved our understanding of how often to present a reinforcement, and of the influence of different types of reinforcements. The influence of cognitive psychology has been more on the techniques for analyzing and organizing content, both in an absolute sense, and in relation to individual differences (Cronbach & Snow, 1976). These joint influences (Figure 3) illustrate the general cognitive model, which assumes that the organismic processing of stimuli must be understood along with the consequences of a response in order to understand learning.

Omission of Motivation

While the progress in both of these areas has been substantial and exciting, it has, in a sense, given us understanding of the head and the stomach of the learner, but not the heart. In the *Republic* (see Cornford, 1962), Plato describes the three-part nature of the soul. The first part is wisdom, or reason, which is associated with our heads and represents the deliberative, or governing part of our behavior. The second is honor, or spiritedness, which is associated with our chests or hearts, and represents the executive influence on our behavior. The final component is personal gain, which is related to the satisfaction of our bodily appetites. It tends to be associated with the belly and the reproductive organs, and determines the productive influence on our behavior. Analogously, we have focused with behaviorism on the influence we can have on maintaining behavior by controlling individual appetites; that is, the access of individuals to desired but scarce resources. We have also focused with cognitivism on understanding the reasoning abilities of people, and how to design instruction accordingly. But with respect to the heart or spirit of the learner, which represents individual determination and persistance, we lack an adequate, systematic approach.

Effort and Performance Distinction

To add this missing link in the evolution of our instructional technology, we make a distinction between effort and performance as categories of behavior. Performance means actual accomplishment; it refers to whether the individual accomplished the required task. Effort refers to whether the individual engaged in action aimed at accomplishing the task. While performance is usually measured by reference to a standard with respect to goal accomplishment, effort is usually measured in terms of persistence, or magnitude of action. Furthermore, effort is a direct indicator of motivation, while performance is an indirect measure, because it is also influenced by other variables.

Types of Motivational Theories

Given that effort is an indication of motivation, the challenge is to understand the components of motivation itself. Motivation is generally defined as that which accounts for the arousal, direction, and sustenance of behavior. Historically, there have been several theoretical approaches to explaining motivation (see Weiner, 1972). On one extreme are environmental theories based on conditioning principles and physiologically based drives (e.g., Hull, 1943, Skinner, 1953). On the other extreme are the humanistic theories that postulate a fundamentally free will at the root of motivation (e.g., Rogers, 1951). The position represented by the present theoretical model is that of social learning theory (e.g., Bandura, 1969; Rotter, 1966), which assumes that motivation and behavior are the result of interactions between a person and the environment. This work follows in the tradition of Lewin (1935), Tolman (1949), and a host of recent and current researchers who have worked on specific aspects and extensions of it (for a review see deCharms & Muir, 1978).

Expectancy-Value Theory

In the context of social learning theory, motivation may be formulated in terms of expectancy-value theory. This theory, particularly as presented by Porter & Lawler (1968) serves as a basis for the present formulation. In expectancy-value theory, motivation is assumed to be a multiplicative function of expectancies and values. The term "value" refers to a person's preferences for particular outcomes from among those that are potentially available, and it has been conceptualized in several ways. Among the more common conceptualizations of "value" are Rotter's (1972) concept of reinforcement value, Murray's (1938) concept of need, and the concept of motives (Atkinson, 1974; McClelland, 1976). In the context of attitude theory, value has been defined directly in terms of beliefs (Feather, 1975; Rokeach, 1973), and in decision theory it is described as utility (Edwards, 1954) or valence (Vroom, 1964). The common thread in all these concepts is that motivation is in part a function of the characteristic choices a person will make for one type of goal over others.

The other major component is expectancy, which in this theory, refers rather explicitly to subjective probability of success. It refers to the extent to which a person is convinced that he or she would be able to accomplish a particular goal if he or she were to try. The development of personal expectancies has been studied in terms of the concept of locus of control (Rotter, 1966, 1972), attribution theory (Weiner, 1974), self efficacy (Bandura, 1977), learned helplessness (Seligman, 1975), and other influences on a generalized expectancy for success or failure (Jones, 1977; Perlmutter & Monty, 1977). A common element in all of these approaches is the attempt to explain the formation and effects of personal expectancies for success or failure, because an individual's subjective expectancies are often quite different from the actual contingencies (Rotter, 1966).

Consequently, we can add values (or motives) and expectancies to our model (Figure 4) as determinants of effort, and this provides the motivational component. As to the relationship between expectancies and values, both Vroom (1964) and Atkinson (1974) argue that it is multiplicative. If zero value is placed on a given goal, or if the individual believes there to be absolutely no possibility of achieving the goal, then the product of the two will be zero. There will be no resultant motivation to exert effort in pursuit of the goal. By contrast, in an additive model either term could be zero, but there would still be a net positive motivational force if either term were greater than zero.

Any systematic effort to influence motivation and the consequent degree of effort expended would be part of a process called motivational design and management (Figure 4). Although there are notable exceptions (e.g., Alschuler, 1973; deCharms, 1976), there are few identifiable, systematic efforts to develop a prescriptive theory that explains how to influence motivation in instruction. Furthermore, both of the preceding examples deal more with techniques for changing the motivational profile of individuals than with the problems of making instruction motivating, a distinction to be discussed in the last part of this paper.

Expansions of the Theory

With one exception, this completes our presentation of the basic components of the theory. However, there are additional relationships that have not been described, and parts of the theory can be elaborated by including more specifically defined variables. For example, with respect to relationships, there are feedback loops (Figure 5) that describe how experience influences motivation. The attempt to achieve a certain goal may or may not lead to a successful performance, which may or may not result in rewarding consequences. This experience will result in a revised set of expectancies with regard to one's subjective probability that effort will

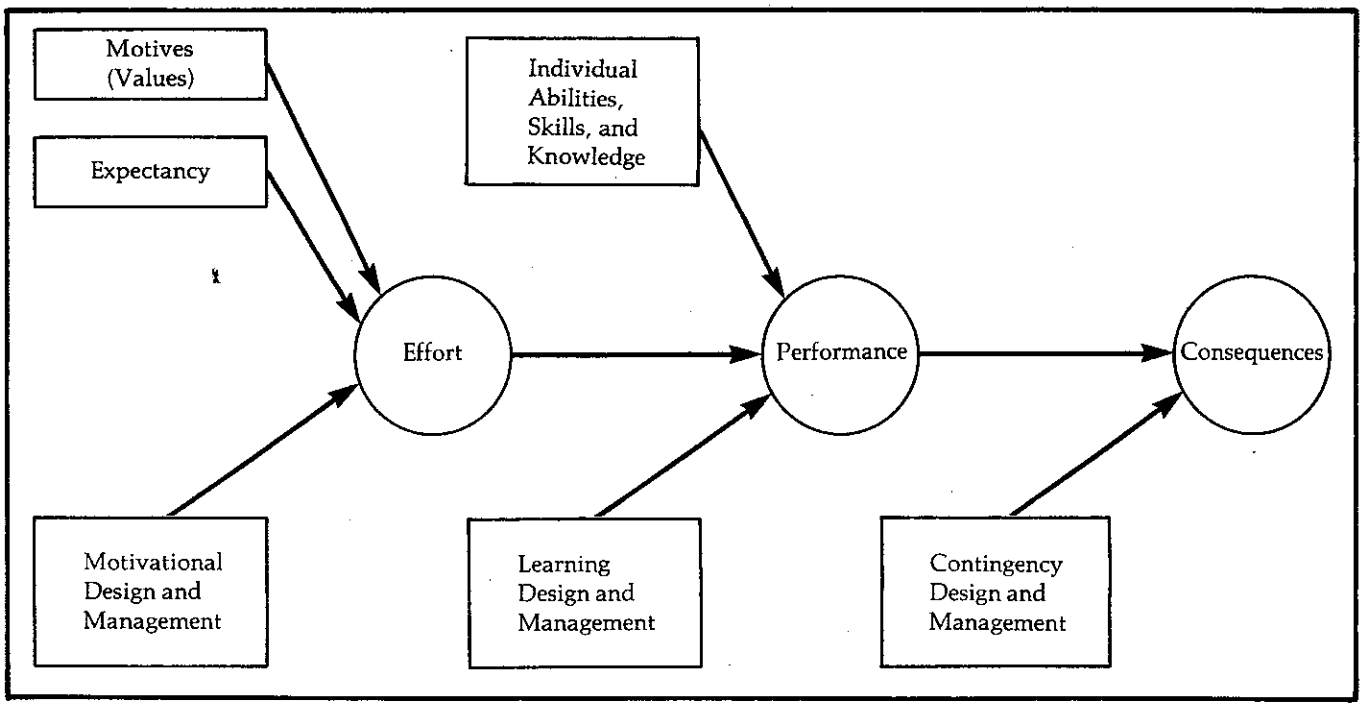

Figure 4. Joint influence of motivational elements, stimulus conditions, and consequences on performance.

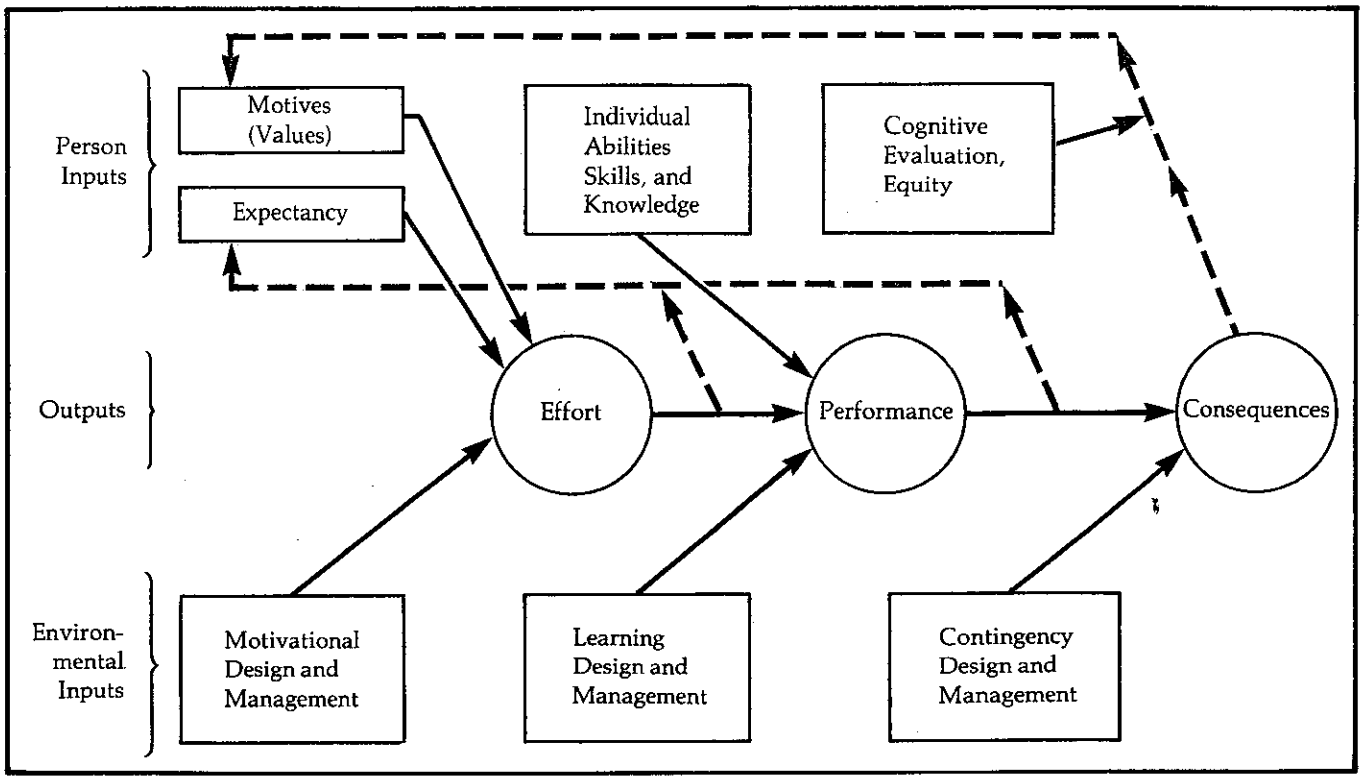

Figure 5. A model of motivation, performance, and instructional influence.

lead to performance, and performance will lead to a reward.

Similarly, a reward obtained as a consequence of performance may or may not offer the anticipated need satisfaction. A student with a "Hollywood" image of psychology who wants to be a psychologist might discover, after working hard to gain admittance, that statistics and laboratory research do not offer the personal satisfactions that were foreseen. This would cause a revision in the student's values and motives, and would lead to a redirection of effort. Accordingly, there is a feedback loop from consequences to motives (Figure 5).

The major element that still remains to be included in the model illustrating the theory is a factor that helps eliminate the circularity in the feedback loop from reward to motives (Figure 5). The process by which reward influences motives can be explained by cognitive evaluation theory (Deci & Porac, 1978), equity theory (Adams, 1965), and cognitive dissonance theory (Festinger, 1957). All of these theories describe a cognitive process that involves the comparison of obtained satisfactions or rewards with those that were anticipated, were obtained by other individuals, or are retrospectively viewed as being appropriate. The interaction of an individual's approach to cognitive evaluation and the actual obtained rewards combine to influence the value the individual will attach to that goal in the future. For example, successful performance at a job could lead to a substantial salary increase. But if the increase were less than anticipated, or less than received by a colleague of perceived equal accomplishment, the salary increase would not have the effect of a reinforcer. It could actually lead to a decrement in performance.

This theory also provides a general context from which to focus on more specific problems. For example, it is useful to expand the outcome labelled *consequences* to make a distinction between intrinsic and extrinsic reinforcement. These alternative types of reinforcement are not always complimentary, as is sometimes suggested in the behavior modification literature. There are educationally important conditions under which extrinsic rewards will decrease the intrinsic satisfaction of an experience (Condry, 1977; Deci, 1975).

In the elaborations of the motivational component of the model, we generally include variables such as locus of control (Rotter, 1966) which modifies expectancy for success and is studied in relation to both cognitive and affective outcomes of instruction (Keller, Goldman, & Sutterer, 1978). Other variables that are being studied in conjunction with achievement motivation include future orientation and perceived instrumentality (Raynor, 1974), which modify motives, particularly the need for achievement. An example of an important but different type of influence is curiosity (Berlyne, 1965), which modifies the need for general activity, including the need to reduce uncertainty.

Because we are particularly interested in the nature of motivation in this theoretical structure, we have attempted to categorize a number of motivational concepts in terms of their relationship to expectancy-value theory (Figure 6). This array helps to illustrate the common threads in these lines of research, particularly with respect to whether their primary influence relates to the understanding of motives or expectancies. Our immediate challenge is to organize, in a similar manner, existing prescriptive principles for influencing these motivational characteristics, and to develop additional approaches where there are important gaps.

It is now appropriate to pause and look at the model we have developed. When the pieces are combined, we have a theory that describes the processes

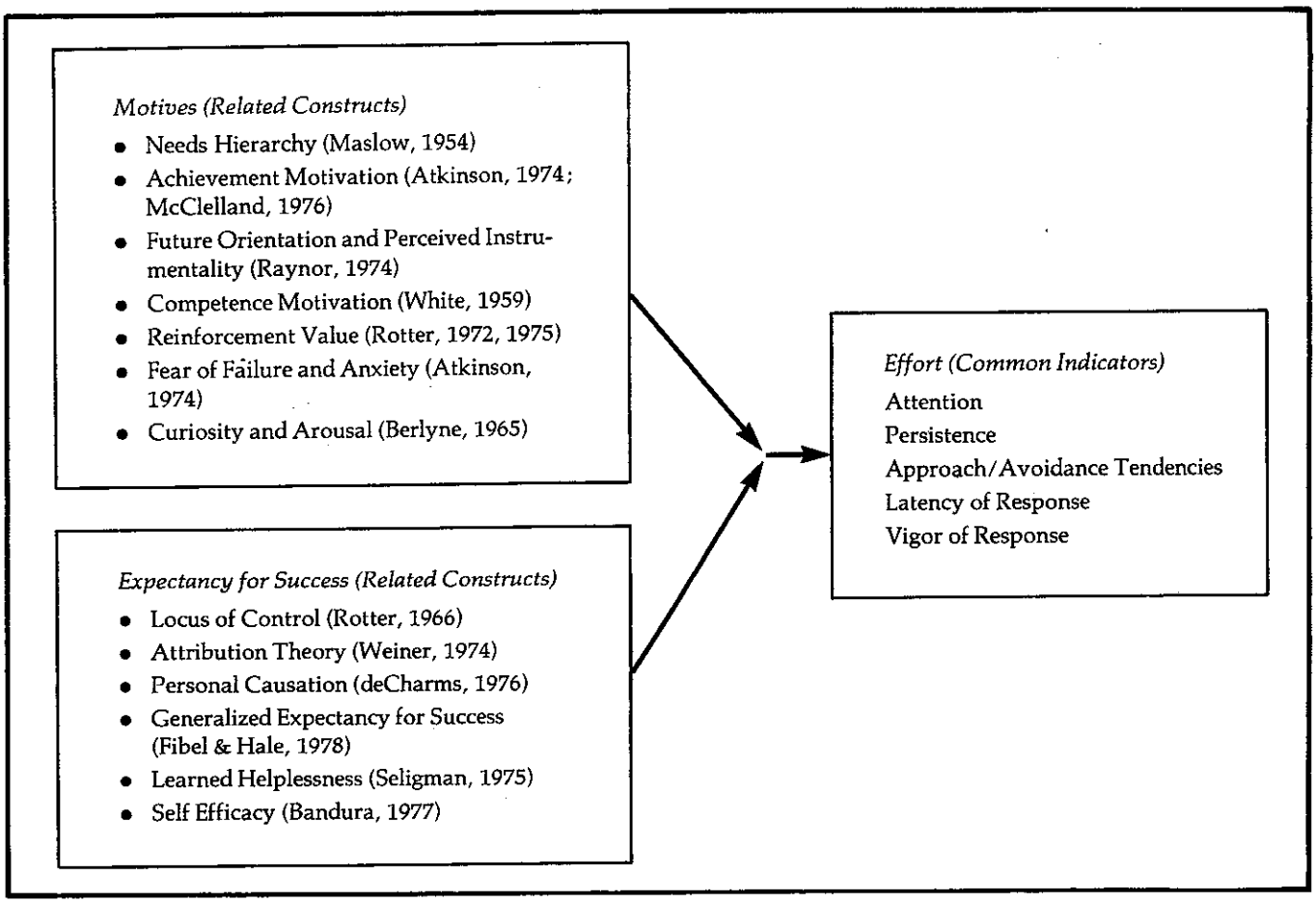

Figure 6. Motivational constructs categorized according to an expectancy-value interpretation.

that influence motivation and performance and that provides the basis for developing prescriptive theories of instructional influences. This theory, as previously indicated, is a social learning theory, which at the most general level assumes (Lewin, 1935) that behavior is a function of the interaction of a person and the environment; $B = f(P,E)$. It further assumes that behavior is purposive (Tolman, 1949), or goal directed. Other assumptions are implicit in our presentation of the theory, but would be excessively tedious to list in this short paper. The theory, as represented in Figure 5, has two important dimensions. Moving from left to right, we have the three major components representing motivation, cognition, and reinforcement. Moving from top to bottom we have person inputs, outputs, and environmental inputs. The environmental inputs illustrate an approach to instructional design that would include motivational design, learning design, and contingency design. The component is primarily descriptive in that it identifies categories of variables and their demonstrated or presumed relationships. This descriptive theory is not incompatable with the framework for theories of instructional design as presented by Reigeluth & Merrill (1979), and particularly as reformulated (Reigeluth, 1979) to include motivation.

Readers should not equate input and output variables with the concept of independent and dependent variables. It is possible to focus on almost any of the "input" variables as a dependent variable. One might be concerned, for example, with the influence of an achievement motivation workshop on changes in the participants' need for achievement. The workshop, although dealing with the topic of motivation, would incorporate motivational design, instructional design, and contingency management in the process of trying to bring about a change in the need for achievement, which is a motivational input variable. How would we know when we had achieved such an influence? It would be by giving the participants a task to perform, such as taking a Thematic Apperception Test, seeing whether they completed the task (an indication of effort, an outcome variable), and then analyzing the result to see whether it contained achievement imagery (an indication of performance, another outcome variable). We would then draw an inference about the participants' need for achievement. Thus, the motive for achievement, an input variable, has served as a dependent variable for this hypothetical study.

Related Research

There is a vast literature of research related to variables included in this theory, particularly when one considers the many different laboratory and clinical contexts in which human behavior is studied. The following brief review is limited to several recent and characteristic lines of inquiry in a program of educational research[1] related to the motivational variables in the theory. More complete reviews are contained in many of the articles cited throughout this paper.

One line of research concerns expec-

tations and behavior. For example, in a study with elementary school children, Loiacono (1977) found that locus of control and method of coping with failure are related. Internally oriented children tend to withdraw following failure, while externally oriented children are more likely to become aggressive and act out their frustration. This tendency was also found by Coleman and Keller (1978) in a study of the relationship between locus of control and sources of bias in course ratings. Internals are more likely to blame themselves for poor performance while externals tend to project their frustration by giving the course a lower rating. The results of both of these studies were consistent with the findings of Keller, et al., (1978) that locus of control is related more to attitudes toward performance than to actual performance. This conclusion was expected based on predictions from attribution theory as formulated by Weiner (1974) and his associates. Other studies (e.g., Daniels & Stevens, 1976) suggest that there may be an interactive relationship between locus of control, course structure, and performance.

When we shift from a narrow view of locus of control as expectancy for control of reinforcements to the concept of locus of causation, we do tend to find a stronger relationship between performance and the combination of a personal sense of causation (deCharms, 1976) and personal expectancy for success (Jones, 1977; Fibel & Hale, 1978). With respect to the study of specific school subjects, research on foreign language learning, for example, has traditionally looked only at aptitude and the motive, or interest, part of motivation. Trabert (1979) is finding that the measurement of expectancy for success combined with subjective definitions of success helps us understand motivation toward the subject.

A different approach to understanding expectancies is that of learned helplessness (Seligman, 1975). This concept refers to a condition in which a sense of helplessness is created during a period of time when the person is actually unable to succeed at a given task. It may be established by inability, impossibility of the task, or a negative set (Hiroto & Seligman, 1975; Keller, 1975). However, once established, the helplessness condition tends to persist even after success is possible. A person with this negative expectancy will readily give up when faced with a task that requires persistence for success. Although there has been considerable research in the area of clinical psychology (Seligman, 1975) with this recently formulated concept, there has been very little in education (Thomas, 1979). The studies that have been completed (e.g., Dweck, 1975; Chapin & Dyck, 1976; Murphy, 1979) suggest that this condition can be reversed, particularly when it is interpreted and treated in a context of attribution theory (Dweck & Goetz, 1977; Abramson, Seligman, & Teasdale, 1978).

These are but a few examples of the types of studies that help us understand the influences on subjective expectancies for success and their relationship to academic performance. Another group of studies is aimed more at the influences of motives, such as the need for achievement, and performance. Persons who are high in need for achievement tend to have a relatively long time perspective; that is, they tend to project their goals farther into the future than those low in need for achievement (McClelland, 1976; Raynor, 1974). They also feel that time is rushing by very rapidly (Knapp & Green, 1960), and that they do not have enough time to get things done (Knapp, 1962).

Following Raynor's theory (1974) that future orientation is also a factor in achievement motivation, Hunter (1979) investigated several aspects of this relationship. He found that future orientation combined with an ability to perceive and project chains of instrumentally related goals into the future is related to higher degrees of motivation and performance. Although effort would be a more direct measure of motivation in these studies, performance is often used as the dependent measure, because it is of central interest to educators. Future studies would benefit from more precision in measuring both effort and performance because of the multiple variables that intervene between them.

Another area of investigation is concerned with curiosity, or a person's responsiveness to incongruity and uncertainty. This characteristic can be defined as a type of motive in that it refers to a person's need or desire to know more about oneself and one's environment (Maw & Maw, 1968). A number of studies were conducted to establish the concept and its relationship to academic attitudes and performance (Maw & Maw, 1964; Berlyne, 1965), but recent efforts tend to be more concerned with approaches to arousing and sustaining curiosity in the classroom (Dodge, 1979).

In summary, these are but a few of the studies and lines of inquiry related to the motivational terms in the present theory of motivation, performance, and instructional influence. This theory is designed to provide an overview for synthesizing these many discrete areas of research. Consequently, its validity will be derived more from the logical consistency with which it integrates the various elements than from specific predictions that are derived. Subsequent work with the theory will be concerned with examining its consistency, and with the identification of areas of inquiry that need specific investigation.

Applications to ID

There are a number of implications and principles for influencing motivation that result from the research associated with this theory. Furthermore, these principles can be incorporated into a somewhat systematic approach to motivational design. An extended presentation of this prescriptive approach, especially the measurement issues (Keller, Kelly, & Dodge, 1978) is not possible in this paper,[2] but we can present an overview of the process, and a brief description of each of the elements.

The process in its schematic form (Figure 7) resembles a general systematic approach. The first step is to identify the motivational problem in terms of type and location. There are four general types of motivational problems and two locations as defined in the present structure. The first three types of motivational problems consist of the extent to which the student perceives the instruction to be interesting and relevant (value terms), and possible (expectancy term). The fourth type concerns the proper management of consequences to avoid negative cognitive evaluation.

In brief, we can say that in order to have motivated students, their curiosity must be aroused and sustained; the instruction must be perceived to be relevant to personal values or instrumental to accomplishing desired goals; they must have the personal conviction that they will be able to succeed; and

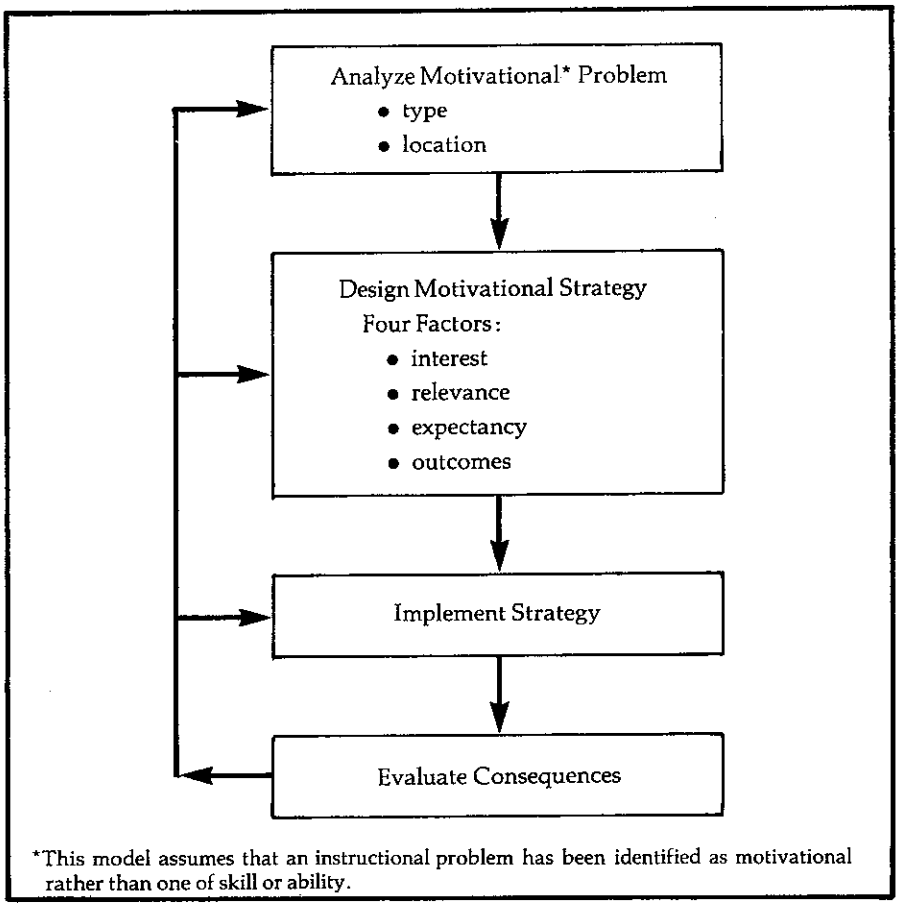

Figure 7. Elements in a systematic approach to designing motivating instruction.

the consequences of the learning experience must be consistent with the personal incentives of the learner.

The location of the problem may be in the learner or in the instruction. We say that the problem resides in the learner when the student is extremely low in a relevant motive such as need for achievement, or has an extremely low expectancy for success. This person would not likely be motivated under any set of instructional design conditions until he or she had undergone a behavioral change experience that improved his or her motives or expectancy for success. Alschuler (1973) has a highly developed program designed to help improve the achievement motivation of school children, and deCharms (1976) has a similar program aimed at helping children improve their sense of personal competency and expectancy for success.

In contrast, the problem might lie in the instruction. In this case, the students are assumed to have the basic motives and generalized expectancy for success, but there are deficiencies in the motivating characteristics of the instruction itself. For example, it is obvious that there are techniques for being boring that will anesthetize even the most natively curious of children. And it is always possible to obscure the relationship between a given topic and any real need a child will experience in his or her life. Each of the four types of motivational problem areas has its associated deficiencies. However, these deficiencies should be controllable by means of effective instructional design. Furthermore, they are probably easier to control than the motivational problems that lie within the individual.

The second step in the process (Figure 7) is to design appropriate motivational strategies in relation to the four problem areas. For example, curiosity is increased in most individuals when an instructor can introduce novelty, surprise, uncertainty, complexity, or ambiguity into a learning situation (Dodge, 1979). The absence of these conditions may account for some aspects of the boredom that some students experience in long sequences of programed instruction. The effort to design presentation strategies that include paradoxes or other forms of incongruity could be well spent if it served to help maintain student interest and attention to the implications of the given concept as well as its boundaries.

Another example of motivational design concerns the effort to make instruction relevant from the learner's perspective. According to Raynor (1974) a person will be more motivated to accomplish a given task if that task is perceived to be instrumentally related to the accomplishment of a desired future goal. Much of instruction is frequently not perceived by students to be related to any perceived future goal. How many times have we heard a student ask, "Why do I have to study this?" All too often the teacher tries to answer this by explaining why he or she thinks it ought to be important to the student. The trick is to get the student to begin to answer his or her own question, and two techniques for accomplishing this include the use of the future wheel and games or simulations.

The future wheel is a simple exercise in which the student puts the particular instructional task (e.g., learn Venn diagrams) into a small circle in the center of the paper. The teacher then instructs the students to imagine what the accomplishment of this task might lead to. Each consequence is written into a new circle, and lines are drawn to connect the new circles to the original one. The teacher then asks the students to imagine what each of the first order consequences might lead to, and to record them in a similar manner. It does not take long for the students to see the multiplicative consequences of their effort. Granted that this is simply a device for getting the students to think, and it would probably have no long range consequences if it were unsupported by other motivational and learning activities, but it does put the responsibility on the students to think about their future. Furthermore, it gives the teacher valuable information about the different characteristics of the students. For example, students who simply cannot construct the future wheel may have internal motivational problems that cannot be solved by instructional design alone. These students would need the previously indicated assistance in building relevant motives or expectancies.

A final example of motivational design concerns the use of games and simulations to help improve the perceived instrumentality of instruction.

Games and simulations are known to be motivating, and the assumption is that they have characteristics such as competition, goal setting, and risk taking that more closely resemble "real life" than a typical sequence of instruction. For this reason, games and simulations are often advocated because they can appeal to various motives in people, and the participants can often "learn by doing" (Orbach, 1979). However, there are often times when games are either inefficient or unfeasible for learning particular skills or knowledge. In these situations, it may still be possible to use games to increase the perceived instrumentality of the instruction. This can be accomplished by designing games that require mastery of the given skill or knowledge as a *prerequisite* for participation. The game then provides an immediate instrumental consequence for mastering the skill, and the consequence is a logical, functional outcome of learning as opposed to an extrinsic, arbitary form of reinforcement. This type of consequence would increase the intrinsic motivation of the learner in addition to the perceived instrumentality.

Furthermore, this use of games could help solve the attrition problem that often accompanies self-instructional programs. These programs sometimes employ games as diversions for the learner, but that is not comparable to the present example. In the present example, the critical characteristics are that the game be functionally related to the learning sequence, and that mastery of the learning sequence be prerequisite to playing the game. Mastery of the prerequisite skills means only that the learner will be able to play the game; it does not need to ensure that the learner will "win" the game, because chance is usually an important element in games.

These are but a few examples of the strategies that can be employed in the process of motivational design. A complete plan would require consideration of all four of the types of strategies, and consideration of whether the problem was located in the learner or the instruction. A complete plan would also require provisions for the implementation and evaluation of the approach (Figure 7). All of these factors need additional elaboration,[2] and a great deal of research and validation.

In summary, the general approach, and some of the specific issues presented in this paper suggest areas in which immediate work is needed. For example, the influences of curiosity, values, expectancies, and cognitive evaluation have been studied independently to a far greater extent than have their mutual and interactive influences. On a more specific level, the use of games to increase perceived instrumentality and to reduce attrition needs to be studied. To the extent that the present approach has merit, it will facilitate the identification and conduct of pertinent practices and investigations.

Reference Notes

1. Participants in a research group at Syracuse University are investigating a number of the issues addressed in this paper. We would welcome correspondance with others working on similar problems. Inquiries may be addressed to the author.

2. A detailed presentation of this prescriptive approach to motivational design is in preparation as this article is published. It will include a consideration of measurement issues in conjunction with the process of identifying motivational problems and motivational characteristics.

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