CHAPTER III

LEARNING HOW TO LEARN: THE NATURE OF LEARNING COMPETENCE

Alfred North Whitehead (1929) used the term "concrescence" to describe the process of translating potentiality into actuality -- the process which constitutes the reality of all things. Humanistic psychologists have also come to view self-actualization as the critical factor in physical and mental health.[1] It is the chief dynamic characteristic of man and the most eloquent testimony of his reality.

The quality of any educational system is determined by the extent to which it is in touch with that reality. To be in touch means to facilitate concrescence.

We have adopted the term concrescence because it includes everything conveyed by the word "development" but goes far beyond it to encompass the transcendent nature of man that arises from consciousness -- a higher state of being characterized by subjective aim or purpose, awareness of the future, and the consequent extension of potentiality indefinitely. In the preceding chapter we discussed the rhythm or periodicity of development. In this chapter we will examine the nature of learning and its role in concrescence.

While the capacity to learn is biologically given and basic reflex patterns innately determined, there are almost no restrictions on what and how much can be learned. Learning enables us to move beyond biological

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[1] See Rogers, Carl. On Becoming a Person. New York: Houghton Mifflin & Co., 1961.

limitations. For instance, the human organism is capable of perceiving only a small range of electromagnetic waves. Wave lengths from 385 millimicrons to 760 millimicrons[1] constitute the visible spectrum. It ranges from violet at one end through the various hues to red at the other. Beyond this visible portion of the spectrum are ultraviolet and infrared, but our eyes have no receptors for wave lengths smaller or larger than those specified. However, through learning about the nature of these phenomena we have been able to develop instruments which are sensitive to wave lengths outside the visible spectrum. These instruments have been made to translate those wave lengths into a stimulus for which we do have sense receptors. Thus, through learning, broadly conceived to include the effects of consciousness, subjective purpose, and therefore understanding, an infinitude of biological limitations can be transcended. This is one of the characteristics which distinguishes man from animal and the basic reason why findings from studies of learning based on animals cannot be expected to tell us all there is to know about learning in man.

Because of memory, learning is cumulative; thus previous learning is always a basis for further learning. It sustains concrescence by creating potentiality, and in so doing invalidates any notion of fixed intelligence.[2] Large numbers of people, however, do not continue to develop very much after age 25; they behave as if their intelligence were indeed fixed

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[1]A millimicron is one-millionth of a millimeter.

[2]From this point of view, we would predict that intelligence tests of the future will not be utilized to "fix any given child into a closed category but will function as a means of sampling the child's developmental state -- an assessment of where he is in any given phase of concrescence. The purpose of that testing will be primarily to avoid unnecessary difficulties and to help the child work through any obstacles which may be inhibiting concrescence.

and no further concrescence possible.[1] What makes the difference between someone who continues to grow and develop until the day he dies and those who seem to cease growing sometime during the third decade of life? Learning competence makes the difference. The most competent learner -- the one who has learned how to learn -- is very likely to be the one who achieves the highest levels of self-actualization. Those institutions which have educational responsibilities, such as the family and the school, therefore need to have an understanding of the nature of learning and learning competence and how the latter can be achieved with reasonable efficiency.

Since the human organism has the capacity to learn and yet is not born as a fully developed learner, we can assume that much of the learning process itself has to be acquired through learning. Therefore the speed and facility with which potentialities become actualized will depend largely upon how well the organism has learned how to learn. Obviously, not all persons are equally good at learning; some are more competent than others. While a small part of this difference may be traced to different genetic endowments, an abundance of evidence indicates that such differences in learning competence are in large measure due to whether or not the child has had those experiences which enable him "to learn how to learn". In our view, the ability to create experiences that will guarantee the development of learning competence in children is the defining characteristic of a good teacher. A good teacher preparation program is therefore one which enables the teacher to gain the fullest possible comprehension of the nature of learning and learning competence.

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[1]William James estimated that the average man used only ten percent of his potential (James Henry. The letters of William James, Atlantic Monthly Press. n.d.). From our point of view, there can be no basis for such an estimation because potentiality itself can be perpetually created. This is the source of man's transcendence.

An Overview of Learning

While most learning theories are an attempt to define the general nature of learning, the theorists who have developed them have generally been motivated by interests very different from those of teachers, who are facing practical situations in the classroom, or of parents, who are busily engaged in the task of directing the learning of their children informally. Consequently, the definitions of learning as they appear within most theories are frequently derived from experiments which are carried out in laboratories under conditions far removed from real life situations and therefore bear practically no relationship to life as it is lived by human beings. Thus, "they provide teachers with little if any basis for making predictions about learning, at least not the kind of learning teachers are most interested in " (Lindgren, 1967, p. 185). There are two difficulties here. On the one hand, much of current learning theory may appear to be of little use to teachers. On the other hand, the kind of learning that traditional teachers are interested in is not necessarily the kind which emphasizes the development of learning competence. In the years to come we must effect a rapprochement between theories ~~the theory~~ of learning and pedagogical practice. We believe that learning competence should be the nexus in that rapprochement. The Anisa Model represents a carefully planned step in that direction.

Defining learning competence as the nexus between theory and practice is important because it gives us a perspective on learning theory and a means of making some tentative judgments about the usefulness of particular research findings in any area that may have a bearing on education.

Basically, it means that we look at research findings and theory to illumine the process of learning rather than the products of learning. Because stimulus-response (SR) theory, for example, focuses on behavioral products, it has limited, though certainly useful, applicability to education as we are defining it. Given the mechanistic tradition of the physical sciences out of which SR theory grew and the organismic philosophy of the Anisa Model, this should not be surprising. The work of Piaget, Bruner, and information-processing theorists are more interested in process and their theories are therefore more pertinent to our task. Edith Levitt (1968, p. 230) has contrasted the views of cognition in children based upon the "process" versus "product" approach.

Process Theories	SR Theories
The individual is viewed as active in the selection and regulation of his mental processes.	The individual is viewed as relatively passive in his selection and regulation of mental processes.
Focus is on inferred mediational processes.	Focus is on behavioral response.
Learning includes the mastery of certain central processes, termed operations or strategies.	Learning is essentially the building up of stimulus-response associations.
The role of intrinsic motivation is stressed, including the predisposition towards resolving incongruities.	Motivation is dependent on extrinsic factors.

In the case of classical and operant conditioning, learning is seen primarily as a modification of behavior. Learning which comes about through these means is very much open to control by agents outside of the learner himself and probably has the greatest degree of applicability to the kinds of learning which involve the emotions and their organization: preference, attitudes, values, and interests. Of critical importance to SR theories of learning is the operation of three principles: (1) contiguity of two stimuli or a stimulus and a response; (2) repetition or practice; and (3) reinforcement. A highly sophisticated elaboration and application of these three principles can be used to explain a wide variety of highly complex behaviors.[1] Although these principles dominate modern scientific psychology, from the point of view of philosophical acceptability and universal applicability in an educational context they have serious shortcomings. We have therefore not adopted SR theory as the primary basis for generating definitions of learning and learning competence. In light of ~~its~~ the dominant position of SR theory, this decision requires a more detailed explanation.

One difficulty with SR theory is the definition of reinforcement, which tends to be circular since it is based on precisely that process which it is supposed to be explaining, i.e., reinforcement is that event which strengthens a response. A reinforcement therefore has no identity of its own but is totally reliant on whether or not a response has been strengthened. Furthermore, it has become so broad in meaning that it is impossible to give a negative instance of it. Anything following a particular kind of behavior can serve as a reinforcement, including nothing. For instance, suppose that a chemist in carrying out an experiment is hoping for no reaction at all. If he gets no reaction, this is reinforcing

[1]Hull's theory is a good example of sophisticated elaboration that is almost confounding in its complexity. See Hull, C. L. Essentials of Behavior. New Haven: Yale University Press, 1951.

since that (i.e., nothing) is what he is looking for and what he hopes to get. Even pain or any number of other stimuli normally considered unpleasant can in specific instances serve as reinforcers. Ultimately, when such a broad definition of reinforcement is used, it has to take its definition from the state of the responding organism. In the case of the human being, this means the definition of reinforcement cannot be formulated apart from the person's intentions, aspirations, hopes, perceptions, memories, or other mental states or conditions such as the language spoken. Yet, these characteristics, which are mediational, "intervening", or concerned with processes going on in the brain, are regarded as unimportant by most prominent SR theorists.

Another problem lies in the fact that, in the case of operant conditioning, the learner must already know how to perform a specific kind of behavior before it can be reinforced. This simply means that the organism is already capable of a given behavior, and therefore presumably "knows" it before reinforcement. We are thus put in the awkward position of saying that we can only learn something after we already know it.[1] What is learned is not a given behavior but an association between a reward (a form of stimulus) and the behavior, an event which must go on inside the brain.

To take another case in point, suppose a child is given a specific learning task and makes a number of trial-and-error approaches in mastering

[1]Piaget jokingly dealt with this inconsistency by saying, "in the beginning, was the response" (not the stimulus).

it. Suppose further that no reinforcement follows any of the trials that are considered errors. The child, without reinforcement, can nonetheless remember the errors he made and can, in fact, demonstrate that he knows them by repeating the errors upon request. Furthermore, the operant conditioning explanation of learning does not account for or adequately explain latent learning or knowledge which is acquired without reinforcement. For example, one can walk through a room and quite incidentally notice where various things might be located in that room even though at the time of passing through the room, there were no reinforcements given which would have caused him to "learn" the location. In other words, the operant conditioning approach to learning simply does not explain or predict many kinds of "knowing" or ways of coming to know things.

Another difficulty stems from the confusion of reinforcement with response feedback. For the most part, reinforcements are generally regarded as extrinsic to the organism (such as a food pellet) whereas sensory-feedback processes are intrinsic to the organism and are going on all the time, many of them at subconscious or unconscious levels. There is no doubt that organized behavior depends upon the intrinsic generation of feedback activity. This intrinsic generation of activity doesn't fit very comfortably into homeostatic or drive reduction schemes espoused by most conventional SR learning theorists. In proposing an alternative to the homeostasis scheme, Smith & Smith (1966, p. 209) argue that the organism can better be described as homeokinetic, that is, it is a system where feedback-generating activity constitutes its optimum state. Thus, while the conditioning model makes the assumption of a motivating state, the cybernetic[1] control approach relates sensory feedback signals to somatic behavior itself rather than to an assumed drive state. Many feedback signals are continuous regardless of drive state. An individual ordinarily selects or attends to those feedback signals which he needs to have in order to control his own behavior, particularly with regard to precise motions that may be necessary to carry out such tasks as typing or violin playing. In the words of Smith & Smith (1966, p. 2):

> Learning is more than the forming of new associations between stimuli and responses and in the strengthening of existing associations. It is a process of reorganization of sensory-feedback patterning which shifts the learner's level of control for his behavior in relation to the objects and events of the environment.

Furthermore, given the association areas of the cortex and the ongoing chemical-electrical activity of the brain, it is very likely that the "process of reorganization of sensory-feedback patterning" may take place at a time very remote from that point at which the behavior related to it or controlled by it becomes observable (Pribram, 1969). Thus, SR definitions of learning which depend so heavily on "modification of behavior" as the chief characteristic, permit a confusion between learning itself and the behavior which is taken as evidence of learning

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[1]Cybernetics comes from the Greek, kybernetes, which means "steerman". Cybernetics refers to the science of steering or controlling motion or activity by the use of feedback information about the consequences of the activity.

which may or may not be immediately observable. For instance, it is known that a person can hear a melody many times and finally "know" it without ever playing it or even singing it. Generally speaking, it is probably a good idea not to assume that the melody is known until one hears the subject sing or play it but in some cases making the assumption that something is not known simply because there is no immediate behavioral evidence of it may get us into trouble. Making such assumptions can lead to practices which in fact may impair further learning. Trying to elicit evidences that learning has taken place by giving an examination that requires performance under conditions which may not seem favorable to that performance will inhibit it and, on the basis of the theory, lead one logically to conclude that no learning or insufficient learning has taken place. Non-performance on this kind of examination cannot be taken as sure evidence that no learning has taken place. The poor showing on the examination may simply indicate that the person does not perform well under the circumstances even though he has the knowledge which the examination purports to reveal.

Bandura (1969) has proposed a theory of observational learning and has demonstrated how a great variety of learning takes place directly simply by observing other peoples' behavior and the consequences of their behavior. This may not only include motor responses but also emotional and verbal responses as well. Avoidance behavior, for example, can be extinguished by having subjects observe no adverse consequences to a model who approaches objects which are feared. Inhibitions in people can be induced simply by having them witness the behavior of a model who undergoes some kind of painful experience because of a certain situation or specific stimuli. Bandura shows how in many cases symbolic self-stimulation or reward intervenes between external stimuli (observing the model) and the overt response of the observer. Observational learning apparently depends upon processes by which observers organize a variety of observed response elements in memory in some symbolic form, and then translate them into new patterns of behavior. The behavior can be learned without performing it and without any reinforcement. The evidence therefore argues for some kind of integrating mechanism in the brain which functions in ways that do not require performance of behavior similar to that of the model or reinforcement. Because a great deal of learning goes on simply by reading books, watching others, or hearing people saying things, with no performance, repetition, or reinforcement required, much of the learning which takes place in schools may be better understood in terms of theories that concern observation, modeling and listening.

Finally, SR theory does not account for unconscious or subconscious determinants of behavior and learning. Kubie (1967, p. 94) states:

> Traditional conceptions of how human beings think and learn have started from a natural but incorrect and misleading assumption that we think and learn consciously. This is not true. Conscious processes are important not for thinking but for sampling, checking, reality testing, correcting, illuminating, and communicating. Even the intake of bits of information, whether from the soma or from the outer world, is predominantly pre-conscious. . . .Once they have registered in us, all bits of information, whether subliminal or conscious, are "processed" by mechanisms which in turn are largely subliminal, the "imageless thought" of the Wurzberger School. This is just another way of restating the thesis that thinking is pre-conscious rather than conscious and that the conscious component is only a weighted sample of the continuous stream of pre-conscious processing of data: a sample which has been given conscious symbolic representation.

On the basis of this statement, it would be important simply to provide the child with a richness of stimuli, whether responses are forthcoming or not, so that the data making up the pre-conscious stream are plentiful, thereby increasing the options available during the sampling procedure he describes.

While stimulus-response theory can by no means provide the sole basis for developing an educational system, what SR psychologists have demonstrated to be verifiable principles of human learning and behavior cannot be ignored and must be taken into consideration when defining the nature of learning and learning competence. However, given our interest in individualizing instruction, we need assistance from theories which can explain the best ways of going about it. Individualizing means making the experience appropriate to the child's developmental level. Thus, before instruction can be individualized, the mediational capacity[1] of the child must be known and this can be more profitably understood in terms of process variables rather than stimulus and response variables (Melton, 1967).

The Common Denominator of Learning Theory

Identification of the common denominator among existing learning theories should lead us to the quintessence of the learning process and thereby provide the theoretical basis for determining the nature of learning competence. We have already seen that three of the fundamental principles of SR theory (contiguity of two stimuli or a stimulus and its response, repetition or practice and reinforcement) are not

[1]Language is perhaps the most important mediator. Thus, one of the most fundamental aspects of individualizing instruction is making certain that the words used to explain something are in the child's vocabulary; otherwise the explanation won't be geared to his developmental level and learning will be impaired.

prerequisites for all learning. In themselves, they cannot be taken as common denominators of learning theory which might be used to illumine ~~illume~~ the nature of learning competence. Furthermore, since they refer primarily to events taking place outside of the organism, they cannot be used to define a characteristic or feature of the learning organism. It appears, however, that these external events impinge upon the subject in ways that do point to what we have come to define as the common denominator of learning theories. Sensing two stimuli as different events presupposes the subject's capacity to differentiate between them, while pairing them (taking note of their contiguity) presupposes a capacity to associate or integrate the two stimuli. We propose to show that differentiation and integration form a part of every learning theory and that together they constitute the common denominator underlying all theories of learning.

While it is beyond the scope of this book to go into a detailed analysis of all major learning theories, a brief sampling from a wide variety of theories in this context will be sufficient to serve our purposes here. Gagne (1966) lists eight types of learning: signal learning, stimulus-response learning, chaining, verbal-associate learning, multiple discrimination learning, concept learning, principle learning, and problem-solving. In signal learning (type one) the organism must be able to differentiate a stimulus from a background of a great variety of stimuli and associate (integrate) that stimulus with an involuntary response already attached to a specific stimulus. For instance, Pavlov's dogs were able to hear a bell (differentiate the ringing sound from all other sounds going on at the same time), associate that particular stimulus with food and an unconditioned response (salivation) and ultimately combine or integrate the bell sound with salivation, thereby salivating upon hearing a bell even though the food is not present. Stimulus-response learning (type two) we already have discussed. Chaining (type three) is a matter of differentiating a number of stimulus-response sequences and combining (integrating) them into a chain. Verbal-associate learning (type four) is a special type of chaining and involves the same processes of discrimination (differentiation) and association (integration). Multiple discrimination learning (type five) involves connecting (integrating) a distinctive stimulus, a car for instance, with a variety of individual stimulus-response associations which are based on the differentiation of stimuli which have been previously learned, such as body contour, chrome trim, vertical grill, twin headlights, and so forth. Such multiple discrimination learning enables one to attach the names of models of cars to each appropriate car. According to Gagne (1966, p . 47):

> . . . learning a concept means learning to respond to stimuli in terms of abstracted properties like color, shape, position, and number, as opposed to concrete physical properties like specific wave lengths or particular intensities.

Abstracting such properties depends upon discrimination or differentiation. Abstracted properties are then integrated and given a name which represents a concept (type six). Principle learning (type seven) involves discrimination (differentiation) of two or more concepts and associating (integrating) them in a way that establishes a particular relationship between them. Problem-solving learning (type eight) depends on being able to identify the essential features of a response (a kind of differentiation) that can function as a solution before one actually performs it. This kind of identification functions to provide direction for thinking which will involve a selection (differentiation) of relevant principles which have already been learned and combining (integrating) them in ways which will enable one to arrive at the essential features of the response which can function as the solution. Gagne (1966, p. 47) says that:

> . . .the recalled principles are combined so that a new principle emerges and is learned. It must be admitted here that little is known about the nature of this "combining" event and it cannot be described with any degree of completeness.

Gagne's eight types of learning have been drawn from a variety of learning theories some of which will be examined in more detail later. What is important to note here are the two complementary processes, differentiation and integration, as a common feature underlying all of them. These processes are consistent with the means by which biological maturation takes place and are consistent with Whitehead's definition of concrescence.[1] We should therefore expect these twin processes to

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[1] "Concrescence is the name of the process in which the universe of many things acquires an individual unity in a determinate relegation of each item of the 'many' and its subordination in the constitution of the novel 'one' " (Whitehead, 1929, p. 321). This is a highly abstract definition of concrescence, but it embodies the fundamental processes of differentiation and integration. Concrescence is the process of actualizing potentiality. Whitehead says that actuality "means nothing else than the ultimate entry into the concrete...." The word "concrete" also embodies the notion of differentiation and integration. Both "concrescence" and "concrete" come from the Latin, <u>crescere</u>, which means to grow and <u>com</u> which means together -- grow together. In other words many different things become integrated into one thing; the process of integrating the many constitutes growth. When we use the word concrete to refer to building material, it is easy for us to lose sight of the original meaning which had to do with the growth of living things. Concrete as a building material, however, <u>is</u> also composed of different elements(gravel, cement, water, etc.) which are combined (integrated).

figure prominently in the definition of learning competence, a definition that will become progressively clearer as the following examination of learning theories is undertaken.

Wheeler's Organismic Learning Theory

Raymond Wheeler's organismic learning theory is basically a Gestalt theory which takes into consideration biological data concerning maturation. Learning is regarded as a progressive development of a human being's adjustment to his environment; it is associated with the maturation process, and proceeds from undifferentiated behavior to differentiated responses that are holistic (integrated) in nature. Wheeler developed eight basic laws of behavior which he felt were applicable to learning and designated maturation, goal, and insight as among the most critical factors in the learning process. Goals and maturation are seen to function together with goals providing direction and purpose. Two of these basic laws, individuation and configuration, are related to the processes of differentiation and integration.

> The law of individuation states that parts of the wholes come into existence through an emergence process called individuation or structurization or differentiation (Sahakian, 1970, p. 83).
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> A system of energy always functions as a unit and always adjusts itself to a multitude of disturbing influences. This multitude of disturbing influences is called a total situation, and the unit that adjusts itself is called a configuration. . . .It is a whole whose parts are dependent upon organization for the manner in which they will function (Ibid, p. 89).

Walter's Brain Wave Theory

Unlike many psychologists, brain physiologists are committed to the idea that what goes on inside the brain between the stimulus and any kind of overt behavioral response -- the "intervening variables" -- is of critical importance in understanding the nature of learning. These intervening variables heavily implicate the on-going electrical activity of the brain represented by brain waves and their rhythms. Since no structure other than the brain can learn and no other structures have this kind of electrical activity, understanding patterns in that activity ought to give us a clue to the nature of learning. Much of this understanding is derived from the convergence of the work initiated by Berger on the electrical rhythms of the brain and the work initiated by Pavlov's discovery that any bodily function can be made the basis of a conditioned reflex, and that one conditioned reflex can be built upon another. W. Grey Walter has developed a model of learning which is based on what is known about these rhythms and how they illumine the problem of learning viewed basically in terms of conditioning. Any animal going through a conditioning experiment will show a number of different brain wave patterns and alterations or rhythms. Unfortunately, there are a multitude of effects which are observable and more sensitive equipment will be required to make sense of it all. Use of a toposcope, however, has been helpful in sorting out many of the intricacies of these observations. Enough is now known to warrant making a number of educated guesses about the nature of learning. Walter's model brings another perspective to the various types of learning already discussed.

He cites as the first step in the learning process the selection (differentiation) of in-coming stimuli which will for some reason become associated (integrated). When such an association takes place in a reasonably permanent fashion, it is "remembered" and the subject has an experience of "meaning". Thus, memory and meaning are inextricably bound up with one another. Walter (1963, p. 168) states:

> Clearly, before an association can mature, there must be a device to sort out and select incoming signals on the basis of the order in which they occur and the regularity of their coincidence. The end result of this operation is to arrange pairs and clusters of events in a scale of meaning; those that come in always exactly together and never separately will be at the bottom. There is plainly a statistical analysis; and if this seems too academic and pedestrian a conclusion we may add a tinge of romance--or squalor--by noting that what we should expect to find just behind the input terminals of our Black Box [the brain] is a bookmaker.

In other words, at all times, the brain quietly and unobtrusively reckons the odds in favor of one set of events predicting another set of events. The odds are based on how any given particular set has been perceived previously. In essence, the brain's ability to learn is dependent very much on this capacity to deal with time and chance. Walter's model shows how the reckoning of such odds takes place. The process involves two operations, one selective and the other constructive. During the scanning process there is a selection of events which share something in common. It is the process of recognizing a pattern. Walter (1963, p. 190) comments that a pattern is hard to define except as something that is memorable:

> . . .the raw material of learning behavior is symbolic abstracted pattern. . .what becomes significant, after statistical selection and constructive preservation, may be very far removed from the nature of the original incoming signals; it is a private image of their relations to one another--an idea.

The selection and construction operations are synonomous with the processes of differentiation and integration.

Tolman's Sign Learning

Edward Tolman was convinced that a preoccupation with the behavior of animals, while useful in developing a stimulus-response approach to understanding behavior, could not hope to provide a full account of human behavior and learning. He felt that additional elements had to be placed between the stimulus and the response -- intervening variables of some kind. These variables, such as motivation, past history of the organism, skill levels already attained, and the on-going activity of the brain itself, all influence behavior and they are influences that are outside of environmental stimuli. Tolman could account for a great deal of behavior without having to rely on concepts of reward or reinforcement. He showed how learning can readily occur if some already meaningful or important stimulus (which he called a significate) was followed by a new or novel stimulus (which he called a sign). Like Walter, he cited frequency of pairings as the basic learning principle. Such pairings create expectancies on which behavior depends. Tolman also made a distinction between learning and behavior or performance -- a distinction which led him to the concept of latent learning. On the basis of a number of laboratory findings, Tolman showed that it was possible for anyone to acquire knowledge without ever showing it in the form of behavior unless there might be some specific occasion or purpose for doing so. Tolman's efforts, therefore, have demonstrated that it is not necessary to reward the learner in order to secure learning but that something "significant" (meaningful, important, or consistent with the learner's purpose) must occur after a sign has been observed, heard, or felt. Tolman (1967, p. 12) states that :

> . . . behavior as behavior reeks of purpose and of cognition. And such purposes and such cognitions are just as evident . . . if this behavior be that of a rat as if it be that of a human being.

Purpose or intention determines goals. One learns by pursuing those things which lead to those goals. Sign-learning is thus an acquired expectation or anticipation of one stimulus which succeeds another in a sequence which finally leads to a goal. When the goal "lives up" to one's expectations, such a confirmation augments the probability value of the expectation. Here again, differentiation takes place on several levels: breaking purpose down into a set of sub-goals; selecting aspects of the stimulus environment which will or can serve as a sign. Integration occurs when particular signs are associated with particular behaviors that lead to a given goal. Because of Tolman's emphasis on the molar nature of behavior and the behaving organism's relationship to the total environment, he is frequently called a field or Gestalt theorist. Many of his ideas are similar to various aspects of Kurt Lewin's field theory.

Whether one is talking about highly controlled laboratory experiments concerning conditioning, trial-and-error learning, or "insight learning", all of them can be understood in terms of the sequence of responses, with ever-increasing regularity and precision, which is dependent upon a differentiation of the stimulus from the general field. Behavior is frequently quite general and imprecise at the beginning of a given learning task and as time passes, behavior becomes increasingly more precise since the person is able to perceive with greater accuracy or differentiation. According to these authors, insight learning may be seen as a sudden differentiation which emerges as the end product of a long series of previous differentiations. From their point of view, learning is logically dependent upon the degree and direction of differentiation which in turn is always determined by the need of the learner and the opportunities for differentiation that are available to him. Thus, the speed and accuracy of learning can be accelerated by first increasing the strength of a subject's need and then increasing the opportunities for the differentiation of essential cues or solutions. An additional factor important to learning is the pertinence of those differentiations which are carried out in a manner having a meaning to the individual himself. In other words, "the pertinence or applicability of learning will be a function of the perceived relationship to self " (Combs & Snygg, 1959, p. 196). Thus, the perceptual field is always organized with respect to self and all differentiations and learning occur with more or less reference to the self.

Snygg and Combs also explain habits in terms of differentiations which are no longer in clear figure and therefore have receded into a kind of ground or what might be called a "lower level of differentiation" than other competing or immediate events that are in clear figure at any given moment in time. On the basis of this understanding, a good way to break a bad habit would be to practice it deliberately and consciously for a time, thereby bringing it into clear figure where it can be dealt with more easily. As long as it remains at a low level of differentiation or as part of the ground, it will not be recognized clearly and dealt with directly. Remembering is also understood in terms of differentiations which can be recalled and forgetting is regarded as differentiations which cannot be called into clear figure. We are able to reproduce on demand more efficiently those events which were or are presently in clear figure while those events which remain in the ground are difficult to bring again into figure. Furthermore, an individual is better able to differentiate on a later occasion what he has previously differentiated, particularly if that previous differentiation was the answer to an acute need and if that need is also present at the time recall is required.

One notices a conspicuous absence of the idea of integration in the Combs & Snygg theory; all of the emphasis is on the process of differentiation. This is primarily because integration or generalization is seen as a particular case of differentiation. They state(1959, pp. 30-31):

> Differentiation, as we have been describing it, seems to correspond to a process of analysis. But it may be asked, do we not synthesize as well? Do we not also see examples of generalization? Are not synthesis and generalization the opposites of differentiation? To answer these questions, it is necessary to remind our-

> selves that the perceptual approach to understanding behavior is concerned solely with the problem of how events are experienced by the behaver. What seems like integration, synthesis, or generalization observed from an objective point of view becomes -- observed from the behaver's own frame of reference -- simply another form of differentiation.

It seems more useful to us, however, to employ the idea of integration as well since it is difficult to see how discrete items differentiated from ground can form a pattern unless they are integrated in some way. From our point of view, differentiation better describes a focus on the attributes of the separate parts and integration describes a focus on the parts as they fit together to form a whole.

Bandura's Modeling Theory

The perception of the behavior of other people is one of the most powerful influences on learning. Modeling and imitation theories attempt to explain how this influence works. We have already made reference to Bandura's theory of observational learning. One of the controversies about such theories is concerned with whether or not new responses are learned and integrated centrally, presumably in the mind, or whether they are organized first peripherally during an observer's actual imitation of a performance he witnesses. Evidence indicates that observers can describe very accurately complex patterns and sequences of movements or responses by observing a model prior to their actually imitating his behavior. Furthermore, they can give such a description without any reinforcement. This means the brain is able to integrate observations and store them in a way that enables the person to imitate the behavior. Obviously, if the response elements which are being observed are already in the repertoire of the observer, he will probably be able to model or imitate the observed behavior relatively accurately the first time around, that is to say, without any practice. If, on the other hand, the response elements are not in the behavioral repertoire of the observer, he will probably not be able to learn the behavior he observes without actually trying it out and making a number of successive approximations of the behavior until it matches that of the model. The development of new kinds of responses always requires the selection (differentiation) of behavioral elements being observed and their combination (integration) into patterns and sequences. Bandura shows how the process of response integration is greatly facilitated by simply watching someone demonstrate the pattern, particularly if the demonstrator can point out the various elements and how they are combined or temporally sequenced. Showing someone by actually doing it is far more effective as a teaching method than simply explaining it. Again, the point is that differentiation and integration as basic processes are required in any form of observational learning.

Mowrer's Two-Factor Learning Theory

The theorists discussed so far have focused on conditioning, cognitive structures, brain wave patterns, or perceptual structures. Mowrer developed a theory of learning based on emotions -- their differentiation and integration -- and their association with signs. His approach integrates the classical conditioning theories of the Pavlov school and the operant conditioning theories of the Thorndike and Skinner school of thought. It takes into account the emotional correlates of conditioning in ways that make sense out of a wide range of phenomena associated with learning of all kinds. His central thesis is that it is emotional reactions which are conditioned and not, for instance, a specific motor behavior. Different kinds of emotional reactions are then paired with the specific kinds of motor activity or other kinds of responses. Making this association, or sequences of such associations, constitutes learning. He derived his theory from the implications of the functioning of the autonomic nervous system which is comprised of two different coordinated subsystems: the sympathetic and the parasympathetic. The sympathetic nervous system handles emergency functions; the parasympathetic system handles routine vegetative processes of the body. Thus the sympathetic system is implicated in such "negative" emotions as fear and anger while the parasympathetic system is implicated in the more "positive" emotional states of joy, love, and happiness. Mowrer has chosen two basic words to describe the emotions mediated by either system: hope for the functions of the parasympathetic system and fear for the subjective, emotional responses mediated by the sympathetic system. Thus, responses that are conditioned are in Mowrer's view strictly emotional and primarily of these two general kinds: fear and hope. His theory can therefore explain learning which takes place in connection with pain as well as pleasure. According to his theory, all we can really learn is to fear or hope and on the basis of this, a repertoire of other responses dealing with content, meaning, motor activity, or other kinds of skills can be accounted for. Much of this repertoire of responses is combined (integrated) in novel ways to produce new learning. For instance, when one learns how to swim he must already know how to move his arms and legs. Learning to swim consists of making those specific kinds of arm and leg movements which lead to feelings of hope that are associated with keeping afloat and inhibiting other kinds of muscular movements associated with fear which are aroused by sinking. In other words, we can only learn emotional responses to stimuli while all other "learned" behavior really consists of performing a variety of responses, perhaps put together (integrated) in novel ways, that we are already able to perform.

One of the critical questions is how to determine what stimuli can initiate the appropriate emotional reaction that will be associated with the acquisition of a particular skill or bit of knowledge. Mowrer shows how the stimuli in question are those which are produced by our own movements. All muscle fibers have embedded in them tiny sense organs which are excited when muscles move. Thus kinesthetic or proprioceptive stimuli, as they are called, are fed into the central nervous system where the consequences to the movements become associated with either hope or fear. In the case of someone learning how to swim, those particular movements of the muscles which lead to sinking, and therefore fear, would be avoided. Other kinds of muscular movements will be tried out. Ultimately, those muscular movements which lead to floating will be conditioned to emotional reactions of hope. Presumably, the learner will continue to do what enables him to feel hopeful and will stop doing those things which lead to a sense of fear or panic. Mowrer's theory relies heavily upon proprioceptive or kinesthetic stimulation as a feedback system. It follows from his theory that little learning will take place if nothing happens to a person emotionally. Any human being is open to excitability in the direction of hope or fear, either of which makes learning possible. Therefore, in terms of this theory, a teacher who is able to arouse emotions of some kind will be a better teacher than one who arouses none. Basically, Mowrer sees the job of a teacher as that of arousing emotional reactions of "feeling good" or being hopeful in connection with the content of the material that is being taught. A teacher who is able to make a good demonstration, for instance, can arouse feelings of hopefulness or fearfulness in the students observing. This is why they can learn simply by watching without any overt action on their part or any external reinforcement.

In the context of Mowrer's theory, differentiation occurs emotionally as feelings of hope (reward) or fear (punishment). Integration occurs as these feelings of hope or fear become associated with specific behaviors, ideas, or other kinds of information.

Newell & Simon's Information-Processing Theory

The development of computers has led a number of psychologists to formulate an information-processing theory of learning (Newell & Simon, 1963). From their point of view, the organism consists of receptors (input), effectors (output), and some kind of control system that joins them. Information-processing theory is primarily concerned with the nature of the control system which is usually heavily dependent upon complex feedback loops. These theories always include postulates about elementary information processes for the explanation of behavior -- processes which they usually hope can subsequently be explained in chemical, biological, or neuro-physiological terms. Most of these theories operate on a number of basic assumptions about the organization and functioning of the central nervous system: (1) that the central nervous system includes a memory in which symbols (discriminable patterns) and composite structures made up of symbols can be stored; (2) that these composite structures include lists (such as the relation "black, opposite, white"); and (3) that the central nervous system is capable of performing a number of elementary operations on those symbols: storing them, copying them, associating them in lists and descriptions, and comparing them to determine whether they are identical or different. These elementary operations are organized hierarchically into what the theorists call programs. Finally, the central nervous system incorporates an interpretive process which determines at each step along the way which elementary operation or process should be tried out next, presumably one process being executed at a time, in serial fashion. Using these basic elements, information-processing theorists have been able to create programs which are used to simulate a number of mental operations such as problem solving, memorizing, and serial pattern recognition.

One of the main problems facing any theory of human problem solving is finding an explanation of how people can take steps toward a solution while at the same time exploring what seems to be an almost infinite number of possible alternative paths. Newell and Simon use the chess player as a case in point. If a chess player were to examine all the possible outcomes of each move available to him, he would wind up examining some 10^{120} different routes to a conclusion to the game. That is ~~more~~ a sum ~~routes~~ larger than the estimated number of particles in the universe--a number larger than the mind can grasp.[1] Obviously there is no way that he could even begin to do a tiny fraction of these. Thus, some options have to be selected over others. As a person becomes skilled in any particular problem-solving environment, he eventually learns to discriminate features of the situation which have diagnostic value. He then associates with those features a variety of responses that may be appropriate to any given objective. To manage this operation, a "table of connections", stored in memory, has to be heavily relied upon. This "table of connections" contains lists of discriminable features associated with possibly relevant actions. In other words, "feature-noticing" and making connections or associations are of critical importance. Here again, we see the same basic two-fold process of differentiation and integration acting upon input as a means of producing output.

Mediation Theory

Other approaches also focus heavily on what happens between input and output. Mediation theorists are interested in such approaches. The sign process or the mediation process is heavily implicated in language learning. Language mediates vast numbers of human responses. Osgood (1953, p. 695) maintains that:

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[1] The number of atomic particles in the universe is believed to be a mere 10^{76}.

> Words represent things because they produce some replica of the actual behavior towards these things. This is the crucial identification, the mechanism that ties signs to particular stimulus-objects and not to others.

Underlying any mediation process is a "detaching" of portions of a total behavior in response to a given object and associating that detached portion to a sign or a word. Behavior is thus differentiated into "detachable portions" and then integrated with a sign. When the child moves from the use of single signs to multi-signs or language proper he is able to go from the concrete to the abstract, from what he experiences in the here and now to what is not immediately present. The function of a sentence is to produce new associations and therefore new learning. The new associations are established through a process of predication which a sentence represents. Sentences are the means by which a person in communicating to someone else initiates a mediation process in that other person. A predication is an assertion that some quality or property belongs to or is associated with another thing--that other thing usually being the subject of the sentence. In other words, a sentence assists a person to mediate a wide variety of associations. These new associations represent something new that has been learned. Again, the qualities or properties which are asserted to belong to some other thing are usually characteristics which have been abstracted (differentiated) and then integrated with the subject of the sentence. The process of differentiation and integration is thus seen again in this slightly different context. Sentences are composed of words and words can be understood as sounds differentiated out of all of the random sounds that the human organism can make. Organization (integration) of these sounds into sentences makes thought possible.

Piaget's Theory

Well before language develops into a mediational process, other kinds of internal "processing" takes place. As we have already noted, the work of Piaget (1953) has been devoted to understanding the nature of these internal operations or structures. Piaget calls the functions of these structures assimilation and accommodation. They are complimentary processes, the former referring to an inner organization and the latter referring to an outer adaptation. Assimilation occurs whenever a person encounters something new in terms of something familiar. Initially, the organism may act in a new situation just as it had acted in other similar situations of the past. According to Hunt, assimilation includes the phenomena which Pavlov labels "conditioning" and which Hull and many other psychologists have termed "stimulus generalization" and "response generalization". As a result of the complimentary processes of assimilation and accommodation, a centrally organized internal structure emerges. These structures, which may be observed as generalizable and repeatable segments of behavior called schemata, tend to organize input so that it more or less fits into their own pattern. The pattern becomes altered through the process of accommodation as the environmental circumstances place pressure on the organism to modify existing schemata in order to make a more successful adaptation. Assimilation and accommodation may thus be seen as cases of differentiation and integration. Hunt (1961, p. 113), describing Piaget's general concept of learning, states it very much in these terms:

> In the course of this dual adaptive process of assimilation and accommodation, the ready-made reflex schemata of the newborn infant becomes progressively transformed through differentiations and coordinations into the logical "organizations" (or operations for information processing) of adult intelligence. This is epigenesis of mind.

During the sensori-motor period,

> . . .the reflexive sensori-motor schemata are generalized, coordinated with each other, and differentiated to become the elementary operations of intelligence which begin to be internalized and which correspond with the problem-solving abilities of sub-human animals.

During the periods of pre-operational thought and concrete operations, which take place from about the age of eighteen months or two years and lasts until the child is eleven or twelve, the child is:

> . . .extending, differentiating, and combining his action-images and simultaneously correcting his intuitive impressions of reality (causality, space, and time).

> As a child interacts repeatedly with things and people, his central processes become more and more autonomous. Piaget speaks of his thought becoming "decentered" from perception and action. With greater autonomy of central processes come both differentiations and coordinations, or groupings, of the action-images into systems which permit classifying, ordering in series, numbering(Ibid, p. 114-115).

The basic processes of differentiation and integration continue into the period of formal operations which marks the ability to classify, order, enumerate, understand and make verbal propositions. Thinking now very much like an adult, the child can differentiate the form of an argument from its empirical content and can use combinatorial (integrative) analysis based on logical structures. He need no longer confine his attention to "concrete reality" but can work with the procedures of science and logic and is free to become socially concerned with how the world might be rather than simply describing and reacting to the way it is.[1] He can then become a critic and a social reformer!

TOTE Theory

Miller, Galanter, & Pribram (1960) have pointed out that the structure of human behavior depends upon the intentions and plans of the behaver. What Piaget termed internal schemata they call the image. The image is all of the accumulated and integrated knowledge which the organism has about itself and the world. The image is drawn upon in order to execute a plan which they define as "any hierarchical process in the organism that can control the order in which a sequence of operations is to be performed" (1960, p. 16). A number of tests must be made in order to determine whether or not any given operation (response to the environment) is appropriate. The test involves identifying an incongruity between the situation as it exists at any given moment and the situation intended by the plan. The nature of the incongruity (which in essence is a differentiation made possible through comparison) determines the next operation, after which another

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[1]Contemplating "how things might be" concerns the creation of ideals, essentially a spiritual activity characteristic of man. It is discussed more fully in Chapter V.

test is made. The test-operation-test sequence continues until the plan is achieved. They call this sequence a TOTE unit (TOTE stands for test-operate-test-exit). The actions of the organism are thus integrated over time into a pattern designed to achieve a plan. Such integration is only possible after the incongruities are identified (differentiation). Perceiving the degree and quality of the incongruity after an operation has been made constitutes the feedback (knowledge of results) that is required to control or guide subsequent operations, after which another test will be made.

Harlow's Theory of Learning Sets

Knowledge of a TOTE unit as it applies to a wide variety of plans to solve a given class of problems is similar to Harlow's concept of a learning set. He states (1949, pp. 51,53):

> Our emotional, personal, and intellectual characteristics are not the mere algabraic summation of a near infinity of stimulus-response bonds. The learning of primary importance to the primates, at least, is the formation of learning sets; it is the learning how to learn efficiently in the situations the animal frequently encounters. This learning to learn transforms the organism from a creature that adapts to a changing environment to trial and error to one that adapts by seeming hypothesis and insight.
>
> * * *
>
> We wish to emphasize that this learning to learn, this tranfer from problem to problem which we call the formation of a learning set, is a

> highly predictable, orderly process which can be demonstrated as long as controls are maintained over the subject's experience and the difficulty of the problems.

Internalizing a learning set involves differentiating the features that are common to a variety of learning-task situations and integrating them into a class to which may be applied a set of rules for solving the problem or dealing with the situation. This set of rules may take the form of a TOTE unit or any other kind of sequential operation whether it be a motor-response or a purely cognitive one. Harlow also indicates that although most of his objective data were limited to the formation of learning sets applicable to cognitive-type problems, he observed what they considered to be similar kinds of learning sets applicable to socio-emotional learning tasks.

It is important to note that learning sets should not be confused with mere stimulus generalization, although of course there is some overlap:

> The formation of socio-emotional learning sets is not to be confused with mere stimulus generalization, a construct applied in this field with undue freedom. Actually, once formed, a learning set determines in large part the nature and direction of stimulus generalization (Harlow, 1949, p. 64).

The Nature of Learning Competence: Toward a Working Definition

As we have seen, learning, on the one hand, refers to more than a modification of behavior; it also refers to changes in ways of perceiving, thinking, feeling, or to an alteration in internal "schemata" or brain-wave patterns associated with such alterations. Pending the development of some means of assessing "new acquisitions" by direct sampling of brain-cell activity, learning can be inferred only from some kind of behavior. Nevertheless, it should be kept in mind that while a change in behavior can be evidence of learning, learning may take place without an immediate and demonstrable consequent change in behavior. On the other hand, behavior may be modified without learning. Changes in behavior may be caused by many things other than learning, such as disease, breaking of bones, drugs, hypnosis, or direct cortical stimulation.

In essence, learning is the process of differentiating experience, whether internal or external, into separate parts and reintegrating them in a new way, thereby providing new information, new feelings, new skills, new perceptions, which may or may not become expressed immediately in some form of overt behavior. When these twin processes facilitate growth in positive directions, potentiality is translated into a positive actuality. Concrescence takes place. Learning in this sense is memory in the service of extending potentialities and continuing development. We speak of "positive" actualization because bad habits and neurotic or dysfunctional patterns of behavior are also learned. It is certainly possible for one to learn "how not to learn". This condition represents a learning disability. It impairs concrescence.

At the heart of learning, ~~are~~ the reciprocal processes of differentiation and integration ~~as~~ function~~al~~ as expressions of the knowing and loving capacities on which concrescence depends. All stimuli, from external or internal sources, of whatever type, are treated in ways that reflect these twin processes. Being able to understand the processes themselves and to utilize and consciously direct them constitutes learning competence. Such competence enables the human being ultimately to assume responsibility for his own concrescence, his own destiny. Both of these processes may have an internal focus (i.e., take place within the mind) or an external focus (i.e., when parts of the outside environment are being manipulated or perceived). A number of combinations are thus theoretically possible.[1] One combination, (BC) for example, is expressed

		FOCUS	
		EXTERNAL	INTERNAL
PROCESS	Differentiation	A	B
	Integration	C	D

by abstracting (differentiating) or selecting from what is stored in one's memory (therefore internal) about a process of learning experienced earlier that is relevant to a present learning task and applying it appropriately to that task in accordance with some purpose or aim. To do this "appropriately" will involve some kind of association (integration) of the differentiated or abstracted aspects of previous learning processes with the requirements of the present task. If the learning task involves the

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1 The full implications of each combination have yet to be explored and the utility of the formation empirically tested.

outside environment then focus of the integration is, at least in part, external.

Intention or subjective aim guides both differentiation and integration. Aim or purpose determines what becomes abstracted and how the abstracted or differentiated elements are integrated.

An important part of learning competence will depend upon the storage or memory of process-type information, (whether it be a psycho-motor process, cognitive or affective, etc.). There are three issues of concern here: selecting what is to be stored; getting the information stored; and, finally, storing it in a way that makes it easily retrievable. The way one is taught can facilitate or inhibit the storage of process-type information. Furthermore, teaching style may facilitate retrieval or make it difficult. Being able to teach in a way that facilitates both storage and retrieval of information about the learning process itself is a paramount characteristic of a good teacher. Teacher preparation based on the Anisa Model therefore centers around activities that enable teachers to create experiences which make obvious the processes of learning and to understand what kinds of teaching facilitates the storage and retrieval of that information.

Children who habitually store process-type information and make ready use of it when tackling situations requiring "new" learning dramatically increase their powers of adaptation to, exploration of, and control over the environment, themselves included. These powers are all evidences of actualized potential.

Mastery of the twin processes (differentiation and integration) with regard to any class of learning tasks, is fundamentally the same as acquiring a learning set, to borrow Harlow's phrase. Acquiring a learning set (one aspect of learning how to learn) depends upon having a number of experiences which are similar but not identical. If the attributes of several learning experiences are identical, there is no means of practicing transfer. Formation of a learning set depends upon a variety of similar but yet different experiences. Otherwise, what is similar in all of them cannot be abstracted (differentiated out) as a precursor to integration, both of which taken together constitutes the learning set.

In terms of the Anisa Model, there are psycho-motor sets, perceptual sets, cognitive sets (or operations in the Piagetian sense), affective sets, volitional sets, and creative sets. In a given individual, all these different sets are inextricably bound up with one another. They enable the organism to interact with the environment most efficiently. Out of the interaction, values on which higher-order competencies are based emerge.[1] The operational aspects of the Model are defined by specifications on the most general sets, each of which explicates a process germane to learning competence. The processes fall into the six categories mentioned above: psycho-motor, perceptual, cognitive, affective, volitional, and creative. Learning competence in a given area depends on internalizing the sets of that area, i.e., psycho-motor competence

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[1] These higher order competencies are discussed in detail in Chapter V.

is progressively achieved as the learning sets of that area are internalized. The more sets a child acquires, the more competent he becomes as a learner and the more power he will have for future growth and development.

An example of how an ordinary experience can be modified to strengthen learning competence will make the operational or practical utility of our definition clear. Skill in making these kinds of applications in any area (psycho-motor, perceptual, etc.) and matching them to the developmental level of each child constitutes the primary goal of training programs for Anisa master teachers.[1]

Consider, for example, the very common experience most babies have of being given a rattle and having it shaken as their hands are held to it, presumably so they can learn to shake it themselves. Most babies will rattle it a few times and throw it out of the crib. We may presume that this happens because the baby is not "advanced" enough for the experience, and therefore won't pursue it because it's "over his head" intellectually, or because the experience itself is vacuous or very limited in its capacity to draw out human potentialities. On the face of it, we can assume the latter to be the case. Why? Because the most obvious possibilities for differentiation and integration are missing. The association of muscle movement that produces the "shaking" to the sound that is heard is made very quickly by most babies and there's really not too much else to be gained from the experience without help from a

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[1] The staffing structure of the Model is discussed in Chapter VI.

"teacher". Let us focus on the perceptual aspects of the experience, select audition as the perceptual mode through which the learning experience is being mediated, and see what kind of help a teacher might give. Immediately we see that a variety of similar but yet different sounds are needed. One rattle isn't enough because it does not provide sounds which can be differentiated or contrasted. What is needed are, say, three rattles, each of which is filled with a different kind of material (such as salt, rice, or dried beans) that will make sounds different from the other two. The three rattles provide him with an experience where he can differentiate on the basis of sound. But what about integration? Three more rattles, just like the first three, are needed. A game can then be initiated. The object of the game is for the baby to listen to the teacher's or mother's rattle and find the one rattle of his that matches the sound of the teacher's rattle. Matching is one form of integration. If the rattle can be of different colors (which introduces the use of another sensory mode -- vision), the child will perform another integration function by associating color with sound so that he can use visual means to select the rattle that can match the sound of any of the three rattles the teacher may wish to use. Other contrasting variables can be introduced, such as speed of the rattling, loudness (or amplitude) of the rattling, or weight of the rattle. Ultimately, one can become as sophisticated or complex as one may wish. The richness of the latter experience with six rattles when compared to a "one-rattle experience" is obvious. That richness makes it a vastly superior learning experience which can be extended in a variety of ways. For instance, new rhythms can be introduced (which requires dealing with the dimension of time) and the relationship of the rattle to other instruments such as the maraca, frequently heard in Mexican or Latin American music. Dealing with the dimension of time involves cognitive operations; making the rhythms requires psycho-motor skills; playing such "music" in a group involves cooperation--a social or moral component. With a little imagination and knowledge of the principles underlying the development of learning competence, an extraordinary "potential-releasing" set of related experiences can quite easily and naturally be planned and carried out over a period of time. To apply the basic principle underlying the achievement of learning competence, one should look for the possibilities of differentiating and integrating in any given situation, and make the alterations in the situation needed to provide such opportunities; then make certain the child can take advantage of those opportunities appropriate to his developmental level.

Thus, the basic question is how to teach a learning set--how to teach children how to learn. Where differentiations and integrations inherent in any given experience are obvious, children easily perform them and remember them. Where they are not obvious or where sequences of experiences requiring transfer do not naturally exist, teachers are necessary. As civilization advances many important experiences will not exist "naturally" and must be provided by teachers who themselves have become competent learners.