CHAPTER IV

THE NATURE OF HUMAN POTENTIAL

AND THE PROCESS OF ACTUALIZATION

In the preceding chapter we discussed learning competence as the key factor in the actualization of potentiality and equated the process of achieving it with "learning how to learn."

In dealing with this subject, one is always faced with a stubborn circularity. If we affirm that "how to learn" is in itself something that has to be learned, then we must ask ourselves the question: "How can 'how to learn' be learned before one has learned how to learn?" We break into that circularity by asserting that it is possible to learn about learning in a way that facilitates further learning. The ability to learn is an inherent feature of life; it is a biological given and it can be used like a light to illumine its own self; it is a power (potentiality)[1] which can be used to increase its own self -- a power to make more power. This is a reflection of that transcendent quality expressed in the capacity to extend potentiality indefinitely. The seeming circularity is a characteristic of this transcendence; it is seen better in terms of a spiral than a circle.[2]

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[1] The word potential comes from the Latin, potens, the present participle of posse which means to be able or to have power.

[2] The same issue of circularity is commonly experienced in a variety of ways which have come to be expressed in well-known phrases: it takes money to make money; success breeds success. In a more formal sense, epistemology, as a branch of philosophy, presupposes that knowledge can be used to understand the nature of knowledge -- that knowledge can be used to understand its own self. Children show that they understand this aspect of transcendence when they play the wishing game and answer the question "What would you wish if you were granted only one wish?" by "I would wish that every wish I make will come true."

Our theory of development rests upon the premise that the transcendent and immanent nature of man constitutes a motivational principle that initiates and sustains the learning process. The process itself, however, can be used to increase its own efficacy. That is what is meant by learning competence. Robert White proposes the word effectance to represent this general motivational principle. He writes (1960, pp. 102-103):

> My proposal is that activity, manipulation, and
> exploration, which are all pretty much of a piece
> in the infant, be considered together as aspects
> of competence, and that for the present we assume
> the one general motivational principle lies behind them.
> The word I have suggested for this motive is effectance
> because its most characteristic feature is seen in the
> production of effects upon the environment. At first
> these effects may consist of any changes in sensory
> input that follow upon activity or exertion, but
> before long the child becomes able to intend particular
> changes and to be content only with these.

White describes effectance as a neurogenic motive to distinguish it from viscerogenic motives on which drive-reduction theories of learning have been predicated. Viscerogenic motives are derived from unmet needs such as thirst, hunger, or sex. These are no doubt sources of motivation for human behavior. White's point is that they do not account for everything we do (as Freud, for instance, proposed in his theory of libido). But to move the source of the motive from the viscera to the central nervous system in our view does not go far enough. We find it more consistent with White's thesis (1959) to call effectance a psychogenic motive, one which cannot be understood solely in terms of

sensations, reflexes, and physiology, but a motive which arises out of the structure of consciousness. ~~which~~ *Thus, while consciousness* may depend on nerves and physiology for its functioning, ~~but which~~ *it* cannot be explained by them.[1] Polanyi (1958, p. 323) makes this point clear:

> The laws of physics and chemistry do not ascribe
> consciousness to any process controlled by them;
> the presence of consciousness proves, therefore,
> that other principles than those of inanimate
> matter participate in the conscious operations
> of living things.

The effectance motive is expressed in the attainment of a variety of competencies, which taken together defines learning competence. The definition of competence is broadly conceived; it means to be effective through striving.[2] Every potentiality is a power which is expressed or actualized through a process. As the process improves in quality, the organism becomes more effective and thus reflects competence.[3] To facilitate the understanding of the implications of our theory of development, we have broken down the potentialities or

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[1]This position represents an abandonment of the positivist's philosophy and is more in keeping with the current thought of modern scientists. It is compatible with Polanyi's idea of tacit knowing which is based upon a theory of ontological stratification. See Polanyi, Michael. Personal Knowledge: Towards a Postcritical Philosophy. The University of Chicago Press, 1968.

[2]The word "competence" and "compete" both come from the same Latin root: com, meaning together, thoroughly; and petere, meaning to seek, to strive, or to go. The present participle of competere is competens, which means to be fit or to be proper.

[3]The word competence also connotes mere adequacy. If we say somebody performs on his job competently, we usually mean that the quality of his work is not embarrassing and even acceptable, but nothing to be highly enthusiastic about. Although the goal of the Anisa system is to develop competent learners, it will enable many to go far beyond that and become what we might call master learners. These are the persons whose achievements may earn them the name of genius.

powers of man into different categories, expressed as processes which underlie learning competence and through which those potentialities become actualized. There is no doubt an infinite number of potentialities or powers, each one of which might be expressed as a process. We have no way of determining them all. Instead, we have tried to identify those processes which have the greatest power. The power of a process is theoretically determined by two criteria: (1) the degree to which it engenders effectance, i.e., degree of control over the environment it brings to the organism; and (2) the extent to which it is fundamental or prerequisite to other processes, i.e., the extent to which it creates or extends potentiality.

In the following sections, each category of potentiality is discussed in general terms followed by a listing of processes pertinent to the category. Subject matter content of all kinds may be imparted while at the same time strengthening those processes which constitute learning competence. Once teachers have the processes well in mind they can plan the educational experience so that content is assimilated while processes are being internalized. The chapter concludes with a brief section on memory as it relates to all potentialities and a statement on the role of evaluation in the maintenance of viability of the entire system.

Psycho-Motor Competence

Psycho-motor competence refers to the capacity to coordinate, control, and direct the movement and position of the voluntary muscles. This capacity depends on the development of an inner construct called the motor base. From the earliest movements of his life, the child experiences a variety of motor activities which lead to this internal

structuring; eventually it emerges as an inner awareness of his own body and its movement capabilities in relation to space and time. (Early, 1969, p. 5). In other words, the child comes to know where and what his body parts are, how they work together, and what they can or cannot do. This positional and functional awareness of the body and the relation of its parts to each other, and collectively to the external environment, enables the child to establish his body as a reference point around which he orders the elements of the space-time world. As the motor base becomes more highly developed, the child becomes more sensitive to stimuli and can organize and interpret them in a more efficient and accurate way. Evidence suggests that most normally functioning youngsters develop this internal structuring before the age of eight (Early, 1969, p. 12).

Structuring depends on information regarding the position and movement of body parts from the vestibular sense (equilibrium) and kinesthetic receptors which are located in muscles, tendons, and joints. As this motor information is organized, feedback from auditory and visual activities are integrated with it.[1] As the child reaches his arms out for his mother for instance, he either hears or sees her at the same time. Thus, this internal, organized awareness of the body develops from the processing of motor information and forms a foundation structure which is integrated with and helps to determine the organization of sensory input (Werner, 1957, p. 60). The next step in the development of this base structure is learning to differentiate the body parts and their movements from two

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cognitive competence.

kinds of undifferentiated or unpatterned mass movements of the limbs: proximo-distal (from the center of the body outward) and cephalo-caudal (from the head to tail). As a child develops these differentiated movements, they must then be reintegrated into general patterns of movement. Our definition of learning competence as it applies to the psycho-motor area is reflected in that twofold process: <u>differentiation</u>, the inner discrimination of each part of the body and the specific movements of which each is capable and their <u>integration</u> into patterned, purposeful, movement. Each new pattern of movement represents the actualization of psycho-motor potentialities.

The next step in the formation of the motor base is the development of the awareness that the body has two sets of sides: symmetrical laterality (right and left) and asymmetrical laterality (ventral and dorsal or front and back). As a child begins to structure space in relation to his own body, he imposes his emerging internal structure on the outer world and increasingly becomes aware that external reality can be known in relation to the sides of his body. Similarly, he gains an awareness of up and down (verticality) and three dimensionality in very much the same way as he gains laterality -- through muscular action to maintain posture and balance. As he begins to move about in the environment the internal structuring is modified to accommodate the new experience. The modification enables him to move about even more efficiently, which causes more modification. Through this vital reciprocal interchange the motor base becomes more complex and thereby increases the child's capacity to make meaningful wholes out of what might otherwise be a sensory jumble.

In general, then, obtaining psycho-motor competence involves being able to pattern movements to fit new situations which have similar attributes to those encountered in the development of earlier motor patterns.

The basic processes which underlie the organization and development of the motor base are as follows:

1. Balance and posture: The ability to move and control the body to maintain a state of equilibrium in relation to the earth's force of gravity and to function within the constraints of that ever-present influence. This presents a tremendous challenge to the human organism as it goes through a wide variety of movement inter-actions in an attempt to master this feat. Subprocesses of balance and posture are:

   a. Laterality (symmetrical and asymmetrical) -- gaining the awareness that the body has sides: right and left; front and back;

   b. Verticality -- gaining an awareness of the up and down parts of the body; and,

   c. Directionality -- the capacity to use one's internal awareness of laterality and verti-cality as a reference in ordering the elements that comprise the three-dimensional environ-ment.

2. Locomotion: The ability to move while maintaining balance and posture. While balance and posture are being attained, mastery over locomotion emerges as a dominant goal of the organism. Subprocesses of locomotion are:

   a. Sequence -- the ability to organize the movement of objects or oneself in an ordered series (culminating in such activities as walking);

   b. Synchrony -- the capacity to control simultaneous movements for a purpose;

c. Rhythm -- the ability to perform a regular succession of repeated synchronous acts designed for a purpose; and,

d. Pattern generalization -- capacity to use the above in organizing the elements that comprise the four-dimensional environment.

3. Manipulation/Contact : The ability to master the skills of manipulation, involving the hands primarily. It includes reaching in order to make contact with some item, grasping which involves sustaining the contact, and releasing which breaks the contact that had formerly been made. Subprocesses of manipulation/contact are:

a. Receipt -- the capacity to grasp/pull objects toward the body;

b. Propulsion -- the ability to move oneself away from an object or move the object away from the body in a predetermined direction; and

c. Purposive movement -- capacity to organize the basic psycho-motor elements of the five-dimensional environment, which includes purpose, will, and intention.

None of these processes or subprocesses occurs in isolation; they happen simultaneously in varying combinations. We have singled them out here and arranged them in a hierarchical order for the sake of conceptual clarity.

As motor activities become differentiated and reorganized into more highly refined patterns, various modes of sensory reception (auditory, kinesthetic, etc.) become functionally integrated with those motor activities thereby increasing the organism's capacity to interact with the environment. George Early indicates that general development proceeds from the motor-base level to the motor-perceptual level, where incoming sensory data are matched to the motor base. At this level, the hand leads the eye. It provides the basis for the next stage, the perceptual-

motor level, where perception leads motor activity. At this level, the eye guides the hand (Early, 1969).

The curriculum of any early education program should include every kind of activity required to release the psycho-motor potentialities which we have represented as processes. These activities cannot take place independently; they will all include perceptual, cognitive, affective, volitional and creative elements.[1] However, any given activity may have a primary focus with primary educational goals in mind. During the early years, the primary focus of many activities should be on the formation of the motor base and the achievement of psycho-motor competence. This has particular significance for working with the slow learner (Kephart, 1971).

Perceptual Competence

Perceptual competence refers to the capacity to <u>differentiate</u> sensory information and then to reorganize or <u>integrate</u> it into patterns which constitute interpretations of reality that prepare the organism for decision-making and action. Interpretation involves relating incoming stimuli to past experience, present needs, and aspirations or intentions which concern the future. Perception is therefore selective. Competent interpretations keep the organism in touch with reality and increase its effectance. Competence thus rests on the development of a perceptual base, an inner structuring, analogous to the motor base,

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[1]Chapter V deals with curriculum design and the integration of actualized potentialities.

which functions as a set of rules generating the perceptual processes of differentiation and integration. Differentiation depends on the ability of the organism to discriminate among stimuli on the same dimension (i.e., color); discriminate among different dimensions (i.e., between color and form); and, to discriminate among different sense modalities (i.e., vision and touch) as much as is possible. Integration depends on a number of organizers, some of which are characteristics of the stimulus and some which are dependent on internal states of the organism. Both require attention, and to the extent that it is not involuntary (i.e., a loud bang compels attention, even if we are directing attention elsewhere) attention is an expression of volition and reflects the intentions and purposes of the organism.

Integration of stimuli through the various sensory modes is insured by the nature of the neurophysiological structures which transmit them. The theory that each sense has its own discrete specialized receptors that only excite the corresponding sensory nerves has been disproved (Gibson, 1966, p. 48). The external senses, according to Gibson, serve as channels which are interrelated rather than mutually exclusive, forming a perceptual system that functions as a source of knowledge as well as receivers of sensation. Sensation refers to the reception of sensory stimuli while perception involves a meaning component that is derived from patterning or organizing sensations. This factor, the meaning component, helps us to differ-

entiate between the two operations.[1] It is therefore important to look at perception not in terms of sensation alone, but in terms of a process of receiving, through a set of reception systems, sensations and their meanings which are derived from interrelationships among the sensations and other internal states of the organism. An examination of some of the research regarding various influences on perception will make this point clear.

It has been well established that internal states of the individual, referred to as sets, hypotheses, and sensoritonic states, profoundly influence the perceptual process (Bruner, 1951; Werner & Wapner, 1952, pp. 324-338). Since it is impossible to attend to all stimuli at the same time, selection is inevitable. Furthermore, former perceptions may cause certain related stimuli to capture the attention. A falling tree which may have startled one in the past may cause one to notice the slightest movement in trees ~~that would be~~ imperceptible to those not having such prior experience. As experience accumulates, perceptual frames of reference -- constituting a kind of perceptual base -- are formed. These frames of reference are vague or diffuse during the

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[1]This is more or less congruent with Whitehead's concept of the nature of perception as it takes place in human beings. He states that perception is of two types: presentational immediacy and causal efficacy. Presentational immediacy refers to sensory input which is not influenced by prior experience with the particular stimulus, thereby constituting a phenomenon that involves exclusively the dynamics of the immediate situation. Causal efficacy, on the other hand, refers to sensory input which is influenced by all experiences the organism has collected as represented in memory. These past experiences help to structure sensations and turn them into perceptions. Thus, the past has influence which can lead to different renditions or interpretations of the same stimulus.

rudimentary stages of perceptual development; they become more sharply

defined with practice. Thus, practice or repetition of particular

experiences can be arranged to facilitate discrimination. The initial

stages of practice can be made more efficient with the use of anchoring

stimuli -- unambiguous first examples. They can serve as clear per-

ceptual frames of reference ~~and~~ which facilitate perception of contrast or

difference. One practical application of this principle would be to

expose children, in the initial stages of learning pitch discrimination,

to pure sounds as a means of forming auditory frames of reference

rather than sounds with complex overtones.[1]

~~Such~~ Perceptual frames of reference create expectancies and a

predisposition to act. The familiarity of stimuli enables the individual

to prepare himself for satisfying needs and avoiding unpleasantries.

Woodworth (1947, pp. 119-124) showed that between the stimulus and the

full structuring of perceptual awareness, there is a trial and check

phase during which ~~time~~ incoming sensations are examined with reference

to past experience with similar sensations. This trial and check

phase is concluded before a percept is achieved and the observer made

aware of it. Expectancies serve several functions: they narrow the

possible modes of action; they direct attention toward the arena where

needs are expressed as set goals; they may cause the reward or punish-

ment value of a stimulus to be increased; and, they enable one to

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[1]Sound waves have frequency (pitch),amplitude (loudness),and timbre
(overtones or complexity of wave shape). A pure tone has no overtones,
so if amplitude and timbre are kept constant, frequency or pitch can
be concentrated on without the confusion of hearing the change in other
variables.

achieve a state of preparedness. All of these tend to increase effectance.

Certain activities which occur moments before stimulation can also prepare an organism for receiving particular stimuli just as the more enduring perceptual frames of reference do (Solly & Murphy, 1960, p. 41). It is therefore possible to induce a context which facilitates perception by first presenting repeatedly a sequence of stimuli that are related to the crucial percept which ~~when~~ one wishes to be fully grasped. This sequence of stimuli forms a context of memoric traces which have an effect on how the final percept will be attained. Another way to induce the perceptual context is simply to give instructions about what is to be expected. This also arouses memories which create particular expectancies which in turn facilitate perception. A good teacher knows how to take advantage of this phenomenon and thereby prepare children to receive certain stimuli over others. Such preparation helps children eventually to develop the capacity to pay attention or concentrate.

Needs are also very important factors in influencing the organism to respond preferentially to certain stimuli. Thirst, hunger, fatigue, or boredom, for instance, increase attentiveness to particular stimuli in preparation for either an approach or avoidance response. Needs thus create motivational states. If the behavior which follows fills the need, the need fulfillment will be experienced as a reward. Where there exists a strong link between a percept and a reward, all sensations related to that percept will have, all other things being equal, a higher claim on attention in the future. Rewards therefore also create motivational states that influence perception. Furthermore, if a stimulus has

punitive implications it can prevent percepts from being fully structured and brought into consciousness or it may "embed" the percept and make it vivid in consciousness. Punishment as well as reinforcement affects perception.

Finally, attention increases the probability of receiving stimulation from specific sources (Solly & Murphy, 1960, p. 177). Attention may be produced internally by generalized energy states as well as externally by powerful stimuli which the organism cannot ignore. When attention is focused on one set of stimuli, it may do so at the expense of other stimuli. Hernandez-Peon and associates (1956, pp. 331-332) demonstrated this phenomenon by planting electrodes in the auditory pathways of a cat. When clicking sounds were made in the cat's ear, they could pick up the transmission of the auditory stimulus on the oscilloscope to which the electrodes were attached. When two mice in a bottle were placed before the cat, however, the auditory nerve did not transmit the clicking sound.

The phenomenon of attention functions in yet another way. It has been found that some people favor one sensory mode over another (Hernandez-Peon, 1956, pp. 331-332). This has been observed in children who tend to learn primarily through either the auditory or the visual mode. If a child has a strong preference for one mode over another, this would certainly be important information for a teacher to have if instruction is to be individualized. It would also be important to have special experiences to strengthen the weaker or neglected mode.

Through interaction with the environment, a perceptual base emerges on which competence as a perceiver depends. As a means of illustration, we will focus primarily on the visual mode of perception. However, it should be kept in mind that a fully comprehensive treatment of perceptual potentialities would , in addition to vision, have to include audition, olfaction (sense of smell), gustation (sense of taste), the cutaneous senses (pressure or touch, pain, cold, and warmth) and an indication of how these are integrated with kinesthesia (sense of position and movement of muscles) and the vestibular senses (which maintain equilibrium). The latter two we have already discussed in connection with development of psycho-motor competence. It should also be borne in mind that vision not only depends on electro-chemical reactions in the retina when light enters the eye but also on muscles which move the eyes in their sockets, those which alter the shape of the lens and those that control the eye-lids. Some of the processes and subprocesses which underlie the development of learning competence in the visual mode of the perceptual category of potentialities are as follows:

 I. Movement Perception[1]

    A. Directionality

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[1]We are referring to seeing objects move rather than the perception of movement through kinesthetic and vestibular senses. Vision is not required to determine that the body as a whole is moving through space. Visual input while on an elevator, for example, remains constant; one determines that the body is moving through vestibular and kinesthetic senses.

1. Fixation (convergence) -- holding an object centrally in the visual field.

2. Horizontal pursuit -- following movement from right to left or from left to right.

3. Vertical pursuit -- following an object moving up or down.

4. Circular pursuit -- following objects moving in a circular motion clockwise or counterclockwise.

5. Depth pursuit -- following an object that is moving towards the eyes or away from the eyes.

6. Combinations of the above.

B. Duration (time perception)

1. Velocity -- being able to see the relative speeds of moving objects (slower/faster), and to see changes in speeds.

2. Synchrony (simultaneity) -- being able to ascertain that objects are moving at the same time.

3. Rhythm -- being able to see a pattern in movement.

4. Sequence -- being able to see a repetition of patterned units.

5. Pace -- being able to see variations in the size of temporal units as represented by movement patterns even though the relationship between rhythm and sequence remains constant.

C. Cause/Effect (Being able to see that one event, B, occurs only after a prior event, A. This is a perceptual form of inference.)

II. Space -- Two-Dimensional and Three-Dimensional

A. Figure-Ground (form perception)

1. Contour -- being able to see the characteristics of the outer form of an object.

2. Edge -- being able to locate the demarcation
   that forms the outer limits of an object.

3. Proximity -- being able to distinguish the near-
   ness or farness of objects in relationship to one
   another.

   a) above/below (height or verticality)
   b) left/right (width or laterality)
   c) front/back or before/behind (judgment
      of depth)
   d) size/area (judgment of distances)

4. Separation -- being able to discern disconnected-
   ness among objects.

5. Closure -- a filling in of gaps to create a
   figure (another form of perceptual inference
   analogous to interpolation in cognition).

6. Continuity -- being able to organize objects
   into a sequence (a form of perceptual inference
   analogous to cognitive extrapolation).

7. Constancy -- being able to interpret the apparent
   changes in shape that occur when perspective
   changes as a function of perspective and not a
   change in the actual shape of an object. The
   visual image of both shape and size changes with
   a shift in perspective; the objects themselves
   remain constant.

B. Projective Space (Three-dimensional only)

   Projective space is determined by a number of cues,
some of which can be interpreted by one eye alone and
some of which require both eyes.

   1. Monocular cues.

      a) proximal size (closer objects appear larger)
      b) brightness (closer objects are brighter)
      c) shading (shadows create perspective and depth)
      d) texture gradient (closer gradients are courser
         in texture)
      e) linear perspective (parallel lines converge as
         they recede from the viewer)
      f) interposition (closer objects obscure objects
         behind them)
      g) movement parallax (closer objects appear to
         move faster)

2. Binocular cues.

    a) convergence (the closer the object, the more the eyes must turn inward toward each other)

    b) retinal disparity (the closer the object the greater the disparity between the image falling on one retina and the image falling on the other)

III. Color

A. Hue -- being able to discriminate among different wave lengths, i.e., being able to tell the difference between red, blue, yellow, etc.

B. Saturation -- being able to discriminate between complexities of light waves, determining the relative amounts of grey present within a given hue.

C. Brightness -- being able to discriminate among different amounts of light reflecting from a given object (being able to tell the difference between shades of one hue such as red, which might be broken down into pink, red and maroon).

D. Contrast -- combinations of all of the above.

IV. Translation of Two-Dimensional Representations Into Their Three-Dimensional Referents

Since a great deal of education in classrooms is mediated through two-dimensional representations of three-dimensional reality, children need particular experiences in order to make this kind of translation.

V. Translation of Three-Dimensional Reality Into Two Dimensional Representations

This occurs primarily through drawing pictures and involves knowledge of the various cues, such as texture gradients, and other depth cues created by shadows, diminishing size with increased distance from the viewer, etc.

The above are among the most important processes that constitute perceptual competence in a visual mode. They underlie learning competence pertinent to the release of visual potentialities and thus

for the basis for a curriculum. ~~in the development of visual competence.~~ [1]

visual perception

The outline presented is tentative. Time, space, and motion, for instance, are inextricably bound up with one another and further research will be required to understand how they are interrelated in visual perception.

Cognitive Competence

For hundreds of years, man has been thinking about the nature of thinking; and yet our thoughts on thinking are not clear. Thomson (1959, p. 27) notes:

> We know very little about the psychology of thinking. What results are available are fragmentary and piece-meal. The psychologist cannot claim to be able to offer a complete description or a well-evidenced general theory to explain how we come to think the way we do.

And Hebb (1949, p. xvi) made the observation:

> In mammals, even as low as the rat it has turned out to be impossible to describe behavior as an interaction directly between sensory and motor processes. Something like thinking, that is, intervenes. . . .What is the nature of such relatively autonomous activities in the cerebrum? Not even a tentative answer is available.

Unfortunately, there appears to be no clear dividing line between thinking and other "things which go on in the head ". Thinking or cognition never happens by itself; it is nearly always associated with some kind of sensory input or perception. Muscular reaction, overt or covert, almost always accompanies it; it is rarely divorced from emotion or feeling and conation or intention is heavily implicated.

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[1] Similar outlines for each perceptual category (hearing, touch, smell, etc.) are being developed.

Generally speaking, psychology has postulated three ultimate functions or processes of consciousness: cognition, feeling, and conation. Cognition has thus been defined as all mental events which can be described as an experience of knowing and thinking as distinguished from experiences of feeling and willing. We feel that it is useful to define cognition or thinking as a form of knowing but not identical with knowing taken in the broadest possible sense. For instance, one can "know" what it is like to stub one's toe or cut a finger. But for our present purposes, it does not appear useful to regard these kinds of knowing as cognition. However, when the events of cutting a finger or stubbing a toe are given symbolic representation in the mind and the symbols pertaining to those events are manipulated, we say that thinking, or cognition, is taking place.

Though we seem to know very little about thinking in one sense, we also seem to know a great deal about it in another sense. At least enough is known to warrant a tentative integration of views about thinking and an exploration of their implications for education. First, let us sample a few definitions and descriptions of cognition or thinking.

Ryle (1949) regards thinking as a "polymorphous concept much in the same way that teaching, farming, or mining are. Each of these refers to an extraordinarily wide variety of activities, ranging from simple to complex." Thomson's (1959, p. 207) summary of what thinking includes reflects the polymorphous nature of thinking as a concept. He writes:

> When a person is thinking, it is usually the
> case that several. . .distinguishable sorts of
> activity are involved within the same situation--
> visual and other types of imagery; verbal contents;
> insights; performances which are the result of the
> evocation of prior learning; strugglings which are
> the steps toward the acquisition of new skills or
> concepts; goal-directed behavior which conforms
> to well-established rule-following models and goal-
> directed behavior which is exploratory in the means
> it adopts toward what may be an unfamiliar goal;
> operations which conform to strategies of a strictly
> logical form and leaps in the dark which appear
> unrelated to any other part of a long series of
> activities.

Dewey (1933), Humphrey (1951), Duncker (1945) and Wertheimer (1945) explored thinking from the point of view of solving problems. There are a number of general characteristics of problem-solving which have been identified by these theorists. First, there must be an awareness that a problem exists, a "felt difficulty" as Dewey phrased it. Awareness must then be translated into a definition of the difficulty. This stage is followed by collection of data pertinent to the problem. This is followed by analysis, formulation of tentative solutions, trying out the solutions, and, if not successful, reformulating or redefining the problem and starting all over again. The term "problem-solving" is also polymorphous. One begins to realize how polymorphous the term "thinking" really is when it is broken down into a wide variety of other terms, each one of which is polymorphous as well.

Vinacke (1952), Leeper (1951), and Bruner and his associates (1956) have explained thinking in terms of concept formation and utilization. To form a concept is to categorize and "to categorize is to render dis-criminably different things equivalent, to group the objects and events

and people around us into classes, and to respond to them in terms of their class membership rather than their uniqueness " (Bruner, et al, 1956, p. 1).

Guilford (1967) specified five major operations which make up the structure of intellect: cognition, memory, divergent production, convergent production and evaluation. He defines cognition as immediate discovery, awareness, rediscovery, or recognition of information in various forms and includes comprehension or understanding within the scope of that definition. Many writers would also include the other four operations in the definition of cognition.

It is impossible to consider thinking without taking into account the role of language and other forms of internal representation. If events or experiences are to be retained in the mind they must be interiorized through images, signs, or some kind of symbolic reference, of which language is the most fundamental. Symbols and signs are critical to thinking (some would limit thinking to their manipulation)[1] because they are the primary means of mediation. While some stimuli elicit particular sequences of behavior without mediation, others elicit mediation processes. These are signs. Osgood (1957), Miller (1953), Vygotsky (1962) and Henle (1958) have devoted considerable time to the analysis of language and signs and their relationship to thought. Vygotsky, for instance, claimed that "thought must pass first through meanings and then through words" and for this reason he followed a method of exploring the nature of verbal thought and speech as interrelated.[2]

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[1]Ruch states: "This process -- using symbols to deal with relationships, objects or events not physically present to the senses -- is called thinking" (1963, p. 323).

[2]The role of language is the development of learning competence will be discussed more fully in Chapter V.

"Thinking" not only remains a polymorphous term, but until there are long-range studies carried out by more than a handful of research workers, we will not achieve clarity in the definition of cognition or thinking. Johnson (1955) expressed the situation succinctly:

> . . .the scientific investigation of thinking is unsystematic and, in general, unsatisfactory. Many psychologists express an interest in thinking and make some raids on it. The field is littered with disabled wisdoms cast off by hit-and-run theorists.

A number of theorists have, however, been both systematic and anything but hit-and-run in their approach. The most notable among them is Piaget, whose developmental theory we have already briefly discussed. Piaget's main thesis is that it is difficult, if not impossible, to understand the nature of cognitive processes apart from the way in which they develop. The view of cognitive processes as a simple copy of external objects or the view that they are a mere unfolding of preformed structures inside the human being are both rejected by Piaget.[1] He insists that cognitive processes are the functions or operations of structures which are "progressively constructed by continuous interaction between the subject and the external world." In other words, cognitive processes come into being through progressive internal organization which depends on both the genetic endowment of the organism and the information or sensory input which comes to the organism through experience with

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[1]From Piaget's view, thinking, particularly in the early years is not bound to language. The internal structures that develop as a result of accommodation and assimilation can operate without language, though language becomes progressively more important for higher level operations. See Furth, Hans G.. Piaget's Theory of Knowledge: The Nature of Representation and Interiorization ,Psychological Review. Vol. 75, No. 2, pp. 143-154, 1968.

the environment.[1] Piaget (1970, p. 704) says:

> Actually, in order to know objects, the subject
> must act upon them and therefore transform them:
> he must displace, connect, combine, take apart,
> and reassemble them.

"Displace" and "take apart" are reflections of the general process

of differentiation while "connect", "combine", and "reassemble" refer

to the process of integration. Through these differentiations and

integrations, internal structures develop. When these structures

function or operate, cognition -- thinking, reasoning -- takes place.[2]

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[1]Piaget's concern has been primarily to understand how cognitive processes develop rather than how to develop cognitive processes in children and he has been frequently impatient with the American propensity to try to "speed things up". A number of authorities on Piaget's work have gone so far as to claim that his theory has no pedagogical value whatever. Others have expressed serious reservations. For instance, Elkind wrote: ". . . the Piagetian concept of intelligence provides no support either for those who advocate formal pre-school instruction or for those who argue for new methods and materials to stimulate intrinsic motivations (Elkind 1969, p. 335).
This seems unwarranted pessimism. If cognition develops through a process of accommodation and assimilation, which is the result of the organism's interaction with the environment, then certainly that function of teaching concerned with the preparation of environments and activities has direct influence on the development of cognition. Without certain kinds of experiences, it is clear that children can grow into adults and never learn how, for instance, to conserve number, substance, weight, or volume, and that higher-order processes of inference may never be developed. Until it is conclusively shown that there is no such thing as teaching, a genetic epistemology that has no pedagogical implications will remain a logical impossibility.

[2]It is not possible within the scope of this text to explain Piaget's theory in greater detail. There are now available a large number of works by Piaget, his associates, and people who have devoted considerable time to the study of his work. His theory is the most fully developed one in the cognitive area and the one which is most congruent with the philosophical basis which we have formulated. Furthermore, his theory has been more systematically tested out over a long period of time than any other.

Thus, the progressive formation of these structures -- the development of a cognitive base analogous to the motor and perceptual bases already discussed -- constitutes the release of potentiality in the cognitive area; it is on the formation of these structures and their functioning that thinking and cognition depend.

There is probably an infinite number of different cognitive processes. We present here a tentative listing of those which seem to be the most fundamental to the extension of potentiality -- those which constitute learning competence. Most of these have been explored to some extent by Piaget, Bruner, and others.

All of the processes are interrelated; some precede others developmentally. All are composed of differentiative and integrative functions operating in different ways on different levels. The most fundamental expression of differentiation and integration in the area of cognition is inference. It subsumes a wide variety of cognitive processes or parts of them. The fundamental characteristic of inference is a going beyond information given by first differentiating two or more entities and then relating (integrating) them in a way that produces new or additional information. Almost all forms of thinking that are not mere rehearsal or simple recall of something stored in the memory have some element of inference in them. For example, mental activities such as analogy, metaphor, induction, deduction, concept formation or classification all may be viewed as cognitive processes which are inferential in nature. The following statements

about cognitive processes should be taken as working definitions. While it is beyond our present purpose to list all known processes or to make a detailed explanation of each one and show its intricate connections and relations to all others, enough is presented to enable teachers to plan activities which can strengthen these processes and thereby increase learning competence.

Object Permanence and Animal Inference

At birth there is little or no awareness of objects; the child cannot distinguish himself from the environment. Therefore the first developmental task confronting the child is differentiating himself from his environment and the objects in it. He is endowed with basic reflexes which enable him to interact with his environment. As we have noted, experience with the environment creates an internal structure which becomes progressively modified as the infant tries to accomplish or adapt more successfully to his environment. Repeated experience with objects that are different from himself leads the child to a fundamental inference, namely, that objects are permanent, even though they may disappear temporarily. This kind of inference is probably predicated on an even more basic kind of inference which Bertrand Russell calls animal inference. He makes the point that sensations which become familiar over time bring with them various associated beliefs and expectations. If these expectations are repeatedly confirmed in the presence of certain sensations, a direct inference is made from the sensational data. He states:

> In what counts as perception of external objects there is much that consists of habits generated by past experience. Take, for example, our belief in the permanence of objects. When we see a dog or a

cat, a chair or a table, we do not suppose that we
are seeing something which has a merely momentary
existence; we are convinced that what we are seeing
has a past and a future of considerable duration. . .
experience has generated in us the expectation that
ordinary solid objects, which can be touched as well
as seen, usually persist, and can be seen and touched
again on suitable occasions. . .the belief in quasi-
permanence, except in exceptional cases, antedates
the scientific doctrine of the indestructibility
of matter, and is itself antedated by the animal
expectation that common objects can be seen again
if we look in the right place (1948, pp. 183-184).

I give the name 'animal inference' to the process
of spontaneous interpretation of sensations. When
a dog hears himself called in tones to which he is
accustomed, he looks around and runs in the direction
of the sound. He may be deceived, like the dog
looking into the gramophone in the advertisement
of his master's voice. But since inferences of this
sort are generated by repeated experiences that give
rise to habit, his inference must be one which has
usually been right in his past life, since otherwise
the habit would not have been generated. . ...thus
reflection upon animal inference gives us an initial
store of scientific laws, such as 'dogs bark'. These
initial laws are usually somewhat unreliable, but
they help us to take the first step towards science
(1948, p. 182).[1]

Thus, object permanence is a case of inference which as a process

is comprised of differentiation and integration. The child must first

differentiate himself from the object and then he must differentiate

between several occasions with the same object followed by an integration

of all of those different separate experiences into one category or one

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[1]Russell makes a further observation that "the progress of science
refines this belief [in object permanence], and in modern quantum
theory not very much remains of it, but science could hardly have been
created without it " (Ibid, 1948, p. 210).

class of experience defined by the common attributes of interaction with the same object. Once that integration is made the inference that the object is permanent or quasi-permanent is made and an internal structure to that effect is created.

Analogy

According to Bertrand Russell, we must accept analogy, in the sense in which it goes beyond experience, as an independent premise of scientific knowledge. It is a form of inference which includes the notion of causality. According to Piaget, this begins to emerge during stage 3 (4-8 months) and reflects the child's egocentrism (i.e., he sees himself as the cause of all activity). Russell (1948, p. 209) defines this kind of inference as follows:

> The principle of analogical inference will have to be more or less as follows: Given a class of cases in which A is accompanied or succeeded by B and another class of cases in which it cannot be ascertained whether B is present or not, there is a probability (varying according to circumstances) that in these cases also B is present.

This kind of inference is progressively refined through all subsequent stages of development and represents a basic cognitive process reflecting differentiation and integration. In the case of Russell's definition, A and B must both be events differentiated out of a stream of events; they must then be associated or integrated through recognition of a pattern or relationship on which the inference rests.

During the period between two to seven years of age (pre-operational thought), the following cognitive processes begin to emerge. Among the most significant developments of this period is the acquisition of language which enables thought to become more flexible because it is no longer tied to sensory-motor schemata and percepts.

Classification, Categorization, Concept Formation

These three terms are frequently used interchangeably in the literature. Bruner (1956, p. 244) defines a concept as a "network of inferences that are or may be set into play by an act of categorization". Categorizing objects, events, feelings, or actions depend upon the child's ability to identify attributes through a process of abstraction or differentiation, and to group the attributes (integrate them) to form the set of critical attributes which defines a class. When something is placed in the class on the basis of its criterial attributes, it has been categorized. Bruner (1956, p. 244) gives an example: "We see an object that is red, shiny, and roundish and infer that it is an apple; we are then enabled to infer further that 'if it is an apple, it is also edible, juicy, will rot if left unrefrigerated, etc.'" Classification enables the child to respond to thousands of different items on the basis of their class membership rather than on the basis of their uniquenesses. This has the effect of reducing the extraordinary complexity of the environment to a level of simplicity that is manageable.

Deduction

Deduction refers to mental operations that proceed from the universal to the particular by way of a middle term. For example, we may start with the basic proposition that "every living thing will eventually die", and conclude that "all animals will eventually die". By way of creating a middle term that associates living things with animals a conclusion is necessarily implied by the two propositions or judgments. Deduction is a type of inference first systematically explained by

Aristotle and usually takes the form of a syllogism.[1] The first two statements of a syllogism are premises. The conclusion is an inference; it is a deduced relationship between the two premises. Deductive inferences are valid by virtue of their form; if the premises are true, the conclusion will also be true. It is important to note here that the truth or falsity of a conclusion is different from the validity of inference. Validity only means that the conclusion necessarily follows from the premises, which may or may not be true. Premises are usually judgments or propositions and they may be false. Conclusions drawn from false premises may be valid though false.

Induction

Induction differs from deduction in that it has no middle term. Instead, there is an enumeration of particulars. Data (the particulars are collected and a generalization is derived from them. This generalization is what is induced or inferred. Such inferences are always incomplete; thus, induction is an imperfect mode of reasoning. Yet, science proceeds primarily on the basis of induction because it is a means of establishing general laws or principles. There are no clear-cut criteria for assessing the validity of inductive inferences. Repetitive experience must either confirm them or deny them.

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[1]The following is a typical example of a syllogism: Melissa is taller than Sara; Kristin is shorter than Sara; therefore Melissa is taller than Kristin.

Interpolation and Extrapolation

Interpolation and extrapolation are what Sir Frederick Bartlett (1958) called "gap-filling processes". Again, they are inferential by nature. In the case of interpolation the sources of inference are relationships derived from context. If, for example, a few letters are unclear in the middle of a word, one can fill in the missing letters from the context of other letters in the word, thereby inferring the word. If there are a number of different word possibilities, the right word may be determined by an inference from the context of other words in the sentence in which it appears.

Extrapolation, on the other hand, predicts continuation of a sequence or pattern which takes its direction from rules inferred from a known part of the sequence. For example, if a child is given the following numbers, 3, 6, 9, 12, he can infer or extrapolate a continuation in the sequence by deriving rules from the relationship of the numbers given.

Other Processes Defined by Piaget

The operations defined by Piaget are particular forms of reasoning and thinking but they are by no means inclusive. They all involve varieties of inferential thinking and are expressions of differentiation and integration. Following are a number of these operations, briefly defined:[1]

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[1]To be classified as an operation by Piaget, a process must meet four criteria, as follows: it must be an action that can be internalized (it can be carried out internally in the form of thought as well as externally in the form of manipulating materials); it must be reversible (it can take place in one direction or in the opposite direction); it always supposes both a transformation and some conservation (for instance), 2 + 2 or 3 + 1, or 4 + 0 all represent transformations but one invariant, namely 4, or the sum); finally, an operation cannot exist alone. It is related to a system of operations or a total structure (Piaget, 1970, pp. 21-22).

Understanding that the amount or quantity of matter stays the same regardless of any change in shape or position is called conservation. there are different kinds of conservation, generally achieved in the following invariant sequence: conservation of number, substance or mass, area, weight, and volume. Children usually achieve the conservation of number berween the ages of five and six and the conservation of volume between the ages of eleven and twelve.

Arranging or ordering items according to recognized differences among them is called seriation. It may focus on length, weight, or volume.

Being able to count verbally does not mean that the child understands number. Understanding develops as the child comes to ignore differential qualities among items and to concentrate on the equivalencies recognized in one-to-one correspondence between items as single, individual items. Thus, one elephant is equivalent to one peanut is equivalent to one apple as far as number is concerned. Whitehead and Russell indicate that number proceeds from one-to-one correspondence between two classes or two sets. If the numbers of two sets can be matched one for one, then the two sets have the same number. Once this has been grasped, the foundation for understanding number is laid. An immediate implication of this for teaching is a recognition of the need for a child to have at least two matchable sets of objects to work with, otherwise the conditions for understanding one-to-one correspondence, on which the understanding of number depends

are limited.

Once the equivalencies in one-to-one correspondence have been understood, sets can be classified according to inclusion (i.e., 1 is smaller that 1 + 1, which is smaller than 1 + 1 + 1, which is smaller than 1 + 1 + 1 + 1, etc.). These sets are also seriable (i.e., they can be ordered according to recognized differences). It thus appears that number is a synthesis of seriation and inclusion. For this reason the construction of number emerges in close connection with seriation and inclusion.[1]

The emergence of spatial and temporal operations are parallel to logical and arithmetic operations and are dependent on the perceptual operations related to space, time, and velocity discussed earlier. Spatial operations are concerned with continuous objects and deal with proximities and separations (whereas number operations were related to discrete, rather than continuous, entities and focused on similarities, differences, and equivalencies). Measurement, an important aspect of spatial operations depends upon a dividing up of continuous space (i.e., a differentiating of space into discrete segments because until they are discrete numbers cannot be assigned to them) and adding them all together (i.e., integrating them into the whole now defined by a figure which represents the number of differentiated parts. Any segment can be taken (differentiated)

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[1]We regard number and number relations (Mathematics) a symbolic system that can be used to understand the ordering of relationships among entities of the physical environment. Such a system is a higher-order system distinguishable in importance fom other Piagetian operations listed here.

from linear space, used as a unit to successively displace the whole in an ordered way so that there is no overlapping or gaps between. "Thus measurement appears as a synthesis of displacement and partitive addition in the same sense as number is a synthesis of seriation and inclusion" (Piaget & Inhelder, 1969, pp. 106-107). One implication of this statement for teachers is understanding that opportunities for displacement as a form of differentiation and partitive addition as a form of integration must be created if acquisition of spatial operations is to be facilitated.

Temporal operations depend on seriation (or differentiation) of temporal events and an addition or inclusion (integration) of the intervals between them and the application of principles of temporal measurement which concern the relationship between velocity and

During the formal operational period children are capable of what Piaget calles combinatory thought. This kind of thought enables the child to explore a wide variety of possible solutions to problems by testing out different combinations presented by data pertinent to the problems. Verbal problems of deduction and induction can now be handled. Hypothetical problems can be dealt with on the basis of logical argument. More complex concepts and operations, such as proportion, can be applied. Ultimately, advanced mathematical and logical concepts such as correlation and probability can be comprehended. In these advanced stages, operations themselves are differentiated and then combined to form new kinds of operations. Operations can continue to be transformed and combined, creating new

propositions which can be again combined to produce new inferences.

The process can go on indefinitely.

The Relationship Between Logic and Psychology

In his book on genetic epistemology, Piaget (1970, p. 13) states:

> The fundamental hypothesis of genetic epis-
> temology is that there is a parallelism between
> the progress made in the logical and rational
> organization of knowledge and the corresponding
> formative psychological processes.

This statement fits into an older tradition which defined logic as the science of the laws of thought. Kant (1885, p. 3),for instance, held that "logic is a science of the necessary laws of thought without which no employment of the understanding and the reason takes place." Cohen (1944, pp. 2-3),in disagreeing with that position, reflects a more contemporary view. He wrote:

> . . .that the laws of logic are not universal laws
> according to which we do actually think is con-
> clusively shown, not only by the most elementary
> observations or introspection, but by the very
> existence of fallacies.

Lefford (1946) pointed out that the principles of logical inference are not possessed by the common man, and that his reasoning proceeds on the basis of psychological inference which is not valid or invalid except when judged as logical inference. Henle (1962) reports a study on the relations between logic and thinking which revealed a number of common errors. They included failure to distinguish between the conclusion that is logically valid and one that is factually correct, and the slipping in of additional

premises or the adding of assumptions after the reasoning process has begun. The reasoning of the human being as he carries out the everyday business of life, however, seems to be based on what Bruner called a thematic process that is more pragmatic than logical (Bruner, 1956, p. 104). This is similar to what Aristotle called "a practical syllogism". A case in point might be as follows: "I am all dressed up and I don't want to get my clothes wet; it's cloudy and looks as if it will rain, therefore I will take an umbrella with me." Practical syllogisms are ubiquitous in everyday life. We could hardly get along without them nor could we understand each other's thinking very well if we didn't have them. However, they will only take us just so far. Logic becomes unquestionably useful when it provides criteria by which the validity of reasoning can be ascertained. If we are to base action on our reasoning, in many cases, our acceptance of conclusions should depend upon the ascertained validity of the reasoning. To that extent, logic has a bearing upon effectance and therefore upon the release of human potential.

Affective Competence

Affective competence depends upon the organization of emotions and feelings. They are never organized in a vacuum, of course, and ultimately what we might call the affective base must be integrated with all the processes of other categories of potentialities. Our survival depends upon an organization of behavior -- patterns of interaction with the environment that keep us in touch with reality. These patterns rest

heavily on the organization of emotions and the way they are integrated with the actualized potentialities from other categories. There is extensive liturature on emotion, feeling, mood, sentiment, temperament, attitudes, values, and affect. It is a formidable task to integrate and interpret it; we present only a small sampling here as an introduction to a suggested conceptual view of the affective area.

While within a given human being there is an emotional aspect to all processes including cognition, it is helpful to conceive of them separately. How one feels seems more directly related to behavior causally than cognition or thinking. Kelley points out that the way knowledge is used depends upon positive or negative emotional supports or associations with it. "It is possible to be a saint or a demon with similar knowledge" (1965, p. 455). Given the fact that affect and cognition are in reality inseparable, one cannot be given consideration at the expense of the other. Arnstine's statement reflects the growing concern over the neglect for the education and refinement of the emotions:

> It is probably no coincidence that where schools are found in which the education of the emotions is ignored, so will be found adults whose emotions are undisciplined -- that is, either suppressed or uncontrolled. Hence our scholars and researchers, our white-collar, and our blue-collar workers pursue their labors humorlessly and without passion; and when their work is over they are often found in thoughtless pursuit of infantile pleasures. Yet this suspension and emotional regression -- is no more than the natural consequence of supposing that rational thought needs to be taught and that an education of the emotions can be safely ignored (1966, p. 45).

The popularity of Bloom's taxonomy of educational objectives in the affective domain is another indication of the education professions' acceptance of the importance of doing something about affective education (Krathwohl,1964). Although others have checked this taxonomy for empirical validity and found it useful enough to implement, we feel that it has serious limitations (Lewry, 1968). It appears practically devoid of those passions and sentiments which are reflected in art and literature and which we have come to associate with richness of emotional life. Anger, disgust, joy, hostility, anxiety, ecstasy, sadness--the genesis and development of none of these and the way they might be related to the basic objectives listed in the taxonomy (receiving, responding, valuing, organization, and characterization) are dealt with. While we agree that there is probably no such thing as "pure affect", the objectives of Bloom's taxonomy in the affective domain are on the one hand incomplete and on the other hand a confusing mixture of a variety of other processes that could be more helpfully classified under some other rubric than affective. For instance, receiving or attending seems to be primarily a perceptual and volitional phenomenon having to do with incoming stimuli and sensory input rather than to an inner emotional life. In other words, there is a confusion between sensation and emotion. Furthermore, the objective, "willingness to receive" is unrealistically passive. We know that the human organism is an active seeker of some stimuli and an active "refuser" of others. A human being cannot survive if he is simply "willing to receive". One must also actively seek out and in some cases be "unwilling to receive" depending upon goals and intentions. The second

category of <u>responding</u> as explained in the taxonomy seems more appropriate as a psycho-motor or cognitive objective, whereas <u>expression</u> would seem a more appropriate term to use when speaking of affective objectives. Responding is broken down into acquiescence, willingness, and satisfaction--again, all relatively passive in character. Nothing is mentioned about initiating action. There are, of course, hundreds of emotional responses which need organization and which are not dealt with under the rubric of "responding". Valuing, organization, and characterization, can only be considered higher-order phenomena that include psycho-motor, perceptual, cognitive, creative, and volitional aspects. There seems to be no theoretical reason for placing them in the affective domain as such. Finally, there is an extraordinary omission, namely, a discussion of the capacity to love and to be loved, of sympathy and empathy and their converse, hostility, hate, and aggression. Before we can make sense out of the organization of affect, we need to make a distinction between sensations and feelings and to define emotion and undertake a basic survey of the kinds of emotions we experience.

Definitions of Emotion

Magda Arnold defines an emotions "as the felt tendency toward an object judged suitable, or away from an object judged unsuitable, reinforced by specific bodily changes according to the type of emotion" (1954, p. 294). While the judgment may include some rational elements, the evaluation is usually immediate and stems from a perceived similarity between a current situation in regard to which emotion is aroused and a situation experienced in the past. Over time, associations between given emotions and situations are built up. A progressive differentiation

of basic emotions into nuances are associated with conditions external or internal to the organism. This organization constitutes the emerging affective base.

The felt tendency is accompanied by physiological changes which are then perceived and continue to reinforce that initial tendency. Arnold (1945) presents evidence that different types of emotion are accompanied by different organic or physiological changes. She categorizes emotions in two ways: (1) according to their object, which may be positive (a tending toward suitable objects) or negative (a tending away from harmful objects); and, (2) according to their operation or degree of impulsion, which may be a tending toward or away from an object when the conditions are favorable (impulse emotions) or a contending for or against something when the conditions are unfavorable (contending emotions). A number of combinations are thus possible. For instance, if the emotion is positive with regard to an object and impulsion toward it is under favorable circumstances, the emotion will be love. If the object is not present, love will be experienced as wanting and desire; if the object is present the love will be experienced as delight and joy. Consider the converse; if the emotion is negative with regard to an object and impulsion away from it takes place under favorable circumstances, the emotion will be hate. If the object is not present, hate is experienced as aversion or dislike; if the object is present, hate is experienced as sorrow or sadness. Hate considered in the way it operates against something under unfavorable circumstances (contending rather than impulse) is experienced as anger if the object is present and is to be overcome. If the object is to be avoided, rather than overcome, and is present, hate is experienced as fear.

Arnold's scheme thus orders emotions according to their aim as directed toward suitable objects and away from harmful ones and to the degree of their impulsion, defined by avoiding or approaching objects when conditions are favorable and contending for or against an object when conditions are unfavorable.

Arnold also makes a distinction between feelings, moods, and emotions. Feelings are defined as "those affective states where the psychological reference is principally to the subject" (Arnold & Gasson, 1954). Feelings are different from mere sensations. It is possible that a given sensation can be unpleasant or pleasant for different persons or even for the same person at different times or under different conditions. Feelings are thus a reaction not to an object as such but to sense perceptions which may be connected with objects. Pleasantness, for example, is a feeling -- an affective reaction to sensory input or sensation. Even thinking or reasoning may provoke a feeling of pleasantness or unpleasantness. When feelings become strong enough, a judgment of suitability or unsuitability is made about the object in regard to which the feelings arose. At this point, feelings become emotions. A mood is simply a protracted feeling state. Arnold cites two basic purposes of emotion: (1) to reach and possess certain objects or avoid them, and (2) the actualization of potentiality. Emotion moves us to action but if our action is to be coherent the emotions directing them must be organized. Such organization

comes largely from the intentions or purposes of the acting subject.[1]

Arnold (1954, p. 214) notes that:

> If, then, emotion is to be instrumental in self-actualization, the objects of emotion must be harmonized with the person's larger goal as a human being. If these objects are seen in their real value, if they are seen in the proper perspective of man's final end, then the judgment that they are suitable will be objective and well-ordered.

For teachers the most obvious implication of knowledge about the way in which emotions are organized is its usefulness in helping them to avoid and/or deal with a variety of learning disabilities that develop when negative emotions become associated with such tasks as reading, or a subject matter such as math. Learning disabilities of this nature develop when one set of potentialities is actualized in opposition to another set, i.e., affect is pitted against cognition.[2] If the opposition is severe it may disturb or threaten the integration of the total personality. Furthermore, whenever emotions urge the person towards objectives which may not be in the interests of the higher-order requirements of the total personality, neurotic patterns of behavior and ultimately

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[1]Arnold makes this point in spite of active sentiment against use of ideas such as purpose or teleology among psychologists. In this connection, we note Mumford's observation that, "if ordered knowledge is to be at the service of man's further transformation, the scientists themselves will have to overcome the naive bias toward teleology they have inherited from the seventeenth century" (Mumford, 1962, p. 172). This problem is more fully discussed in the section on volitional competence, this chapter.

[2]A theory of learning disabilities, i.e., impairments in the translation of potentiality into actuality, has yet to be fully derived from our general theory of development. In general terms, a disability is a consequence of failure to integrate actualized potentialities, thus resulting in internal conflicts that disrupt normal interaction with the environment.

psychoses may develop.[1]

Young (1961) proposes another scheme for understanding how emotions are organized.   He maintains that affective processes can be defined in terms of three attributes: sign, intensity, and duration. Sign indicates whether the affective process leads to approach-maintaining (adient) behavior in which case it is designated with a positive sign or it may have a negative sign and therefore underlie avoidance-terminating (abient) patterns of behavior. In addition to being positive or negative, affective processes may vary in intensity or degree along a bi-polar continuum between negative and positive extremes. Finally, in addition to sign and intensity, affective processes will differ in duration. Young agrees with Arnold that neuro-behavioral patterns are organized to minimize negative affectivity (distress) and maximize positive affectivity (delight). While there are two opposed directions of change there are logically four main kinds of affective change: increasing positive affectivity, decreasing positive affectivity, increasing negative affectivity, and decreasing negative affectivity. Young's distinction between sensation and feeling coincides with Arnold's, namely, that feelings carry practically no information; they are subjective reactions to some kind of sensory input.

Following is a brief summary of principles which Young cites as fundamental to any tentative formulation of the nature of emotion: all

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[1]In the next chapter, dysfunctional self-images are discussed. Basically they result from emotions having been organized against the self rather than in support of it.

stimulation has affective as well as sensory consequences (e.g.,
if you cut yourself, it will be painful but there will also be a
negative affective arousal associated with that pain); affective
arousal orients the organism toward or against the stimulus-object.
They lead to the development of motives. The sign of any given
affective arousal will determine whether an approach-maintaining
motive or an avoidance-terminating motive will develop. Contrary
to Mowrer's position (reviewed in Chapter III) Young states that
affective arousal is not necessary for human learning but certainly
can support, facilitate, or impair it. Affective arousal plays an
essential role in organizing, activating, regulating and sustaining
neural-behavioral patterns that are learned. The laws of conditioning
apply to affective processes which in turn regulate behavior by
influencing choice. The organizing functions of affective processes
are among the most important; one of the basic underlying principles
of organization of the emotions is the following: any stimulus which
occurs consistently, repeatedly, and contiguously with a primary
affective arousal, whether negative or positive, will tend to elicit
a similar affective arousal. In other words, affective arousals are
conditioned to the stimulus-situation in which they occur but the
stimulus-situations acquire incentive value by virtue of their associ-
ation with the affective arousal. There is in this principle an
important lesson for teachers. If children are to learn, they must

experience positive affective arousal with regard to learning tasks set them. If negative affective arousals are stimulated, learning in the formal situation will be impaired.

The organizational schemes of both Arnold and Young are useful but they say little about the developmental aspects of organizing emotions. Plutchik built a model of emotions based upon adaptive processes identified by J.P. Scott in his book, <u>Animal Behavior</u> (1958).   Plutchik (1962) used only five of Scott's nine adaptive processes and differentiated some of the others, finally arriving at eight prototypical dimensions of emotion. Unlike Arnold and Young, Plutchik's model organizes the actual emotions rather than ways of conceptualizing overall attributes of emotions (such as intensity, sign or duration). Each dimension is then differentiated into finer nuances. Following is Young's list of prototypical dimensions of emotion and suggested differentiations of them:

1. Incorporation (becomes differentiated
    into acceptance and admission);

2. Rejection (differentiates into tiresomeness,
    boredom, dislike, disgust and loathing);

3. Destruction (differentiates into annoyance,
    anger and rage);

4. Protection (differentiates into timidity,
    apprehension, fear, panic, terror);

5. Reproduction (differentiates into calmness,
    serenity, pleasure, happiness, joy and
    ecstasy);

6. Deprivation (differentiates into pensiveness,
    gloominess, dejection, sorrow, and grief);

7. Orientation (which is a pattern of behavior that occurs when an organism contacts a new or strange object; it differentiates into surprise, amazement and astonishment); and,

8. Exploration (differentiates into set, attentiveness, expectancy, and anticipation).

The differentiations listed above after each prototypical dimension begin with the least intensive form of the differentiation and proceed through the most intensive forms. These differentiations do not necessarily represent a complete list, but they give a good idea of the organization of the model.

The above three organizational schemes of Arnold, Young and Plutchik further demonstrate the inadequacy and incompleteness of Bloom's taxonomy. From our point of view, any useful taxonomy must indicate an organization of emotions that will facilitate the release of potentialities in all other areas (psycho-motor, cognitive, etc.) while at the same time supporting a further refinement within the affective area itself. The basic organizational scheme we propose rests on the thesis that the positive emotions need to be experienced in a way that increases the probability that the organism will continue to express them while the negative emotions need initially to be coped with and then managed. There are times, of course, when strong negative emotions are appropriate and serve the goal of self-actualization and there are times when the positive emotions need control or constraints placed upon them. This is, in essence, what management and coping means.

Although several theorists have attempted to understand the emotional development of a child, few empirical studies have been carried out over a long period of time using some well-defined theoretical base. Kessen et al.(1970) have indicated that "with the exception of smiling and other signs of attachment, the empirical base for the early differentiation of emotional expression is shaky". Bridges (1930) developed a schema showing how emotional responses are differentiated or elaborated over time. Her schema is based upon observations of infants in a foundling hospital and a number of children in a nursery school. She begins with excitement or arousal as the basic emotion. It differentiates in a positive direction into delight, elation, affection and joy and in a negative direction first into distress, followed by anger, disgust, fear and jealousy. According to her schema, all of the negative emotions appear before six months, except jealousy which appears around fifteen months. Excitement differentiates into distress before it differentiates into delight, with elation and affection appearing between ten and twelve months.

Bowlby's work on attachment and dependency indicates that the child is not born an emotional _tabula_ _rasa_ and that attachment or emotional dependency begins to develop between the third and sixth months. Whenever the infant is separated from the mother-figure, anxiety and distress are apparent. When the child is in physical contact with the mother or has visual contact, the child experiences various forms of pleasure. Attachment from Bowlby's point of view forms a kind of instinctual base out of which emotions are differentiated and integrated into the variety of positive and negative forms that have already been discussed.

Our own specific developmental theory about emotional development awaits further research and elaboration. We have identified a large number of processes pertinent to learning competencies in the affective area. These processes may be grouped under four main categories: inhibition, coping, management, and facilitation. Such emotions as hate, rage, and hostility may require inhibiting. Frequently inhibition is only temporary and takes the form of a postponement, as in a legitimate delay of gratification. Fear, anxiety, anger, frustration, and jealousy typically require management. A number of emotional responses aroused by different experiences may require coping first, such as coping with rejection, coping with failure, pain, disappointment, criticism, loneliness, sadness, and so on. The facilitation category may pertain to emotions such as ecstasy, joy, happiness, etc., and includes the ability to be free, abandoned, and uninhibited when they serve the goal of actualization. These same emotions may also require management or inhibition depending on the circumstances. Inhibition, coping, management, and facilitation taken together constitute the control of feeling and emotions that creates the order in one's emotional life. Affective competence rests on that order. The model contains specifications on each of these processes and an explanation of what kinds of experiences can be planned to facilitate their development. It is impossible to discuss organization of emotion and feeling in these terms without considering volition and intention. These are more fully treated in the next section.

An in-depth discussion of one of the processes will be useful as a means of indicating the complexity and richness of our emotional lives and how important it is for education not to ignore the affective parts of development. Since anxiety is the chief symptom of neuroses and is an emotion experienced by non-neurotic persons as well, an exploration of the management of anxiety will be illustrative of the scope and critical nature of this aspect of our potential, currently so neglected by most educational systems.

Management of Anxiety

Anxiety is so pervasive in contemporary society that the twentieth century has been called the "age of anxiety" (Auden, 1947). We have selected management of anxiety for a more detailed treatment because it is the chief symptom of emotional disturbance of modern society. How to deal with this has to be learned; if our schools are only places that create anxiety but do not teach children and students how to manage it, we will continue to be part of the problem rather than a part of its solution. Unmanageable anxiety leads to depression, and eventually to suicide or psychotic break. Our concern here is to underscore what we believe to be the central role of anxiety in the process of concrescence: in its most common form, anxiety is a crisis of integration on some level, and as such it announces an opportunity to redifferentiate and to bring together diverse elements in the creation of a new unified whole. It is, in Whitehead's terms, an opportunity for a creative advance into novelty. In this sense, anxiety is a necessary concommitant of growth and creative change.

however, if it becomes unmanageable, it is destructive. In our view, no educational system of the future can ignore the role of anxiety in the release of potentiality and fail to make provision for teaching children how to manage it successfully.

Although anxiety may be the hallmark of twentieth century life, the philosophical origins underlying modern theories of anxiety are found in the writings of nineteenth century existentialists. The work of Søren Kierkegaard laid the foundation for more contemporary approaches to anxiety, in particular those identified with third-force psychology, such as Maslow, Frankl, Buber, and May. Kierkegaard (1944, p. 44) felt that the distinguishing feature of man is his range of possibilities (potentialities) and the freedom to become something beyond his present being and knowledge -- to push into the unknown. This capacity for freedom brings anxiety. "Anxiety is the state of man when he confronts his freedom". When a person achieves self-awareness, a conflict arises between the propensity to move ahead in one's development to explore the novelties of being and retreating from his freedom because the unknown which holds the promise of growth also contains potential threats to the individual. Kierkegaard claims that if one is to live creatively, this delemma is inescapable, for in every experience of creativity something in the past must be sacrificed so that something in the present may be born. From this point of view, anxiety cannot be regarded as a pathological phenomenon. In fact, Kierkegaard speaks of anxiety as "a school" through which any person must pass in order to develop his potentialities. Anxiety is inextricably found up with what Kierkegaard claimed to be an ultimate concern in everyone's life: how to will to be oneself. Since we are

always in the process of becoming, one can never define the self specifically; one of the characteristics of self is the freedom to go on becoming. This always precipitates a subjective experience of anxiety. If one avoids willing to be himself, anxiety may reach unmanageable proportions. Avoidance takes the form of a variety of different strategies all aimed at denying or restricting self-awareness. These strategies come into being in the child by the ways in which teachers and parents relate to children as they take steps in the direction of exploring their potentialities. Kierkegaard states that blocks to self-awareness occur when the individual is unable to face and to move through anxiety episodes at various points in his development. He emphasizes the point that selfhood depends upon the individual's capacity to confront anxiety and move ahead _in spite of it_. We propose that with appropriate educational experiences, the child can manage anxiety and move ahead _because of it_. Avoiding anxiety as a habitual way of dealing with it is to abandon responsibility for one's own growth and development and is inimical to the philosophy of the educational system we are proposing.

Tillich also developed his conceptualization of anxiety within the existential tradition. He believes that anxiety inheres in the very fabric of man's consciousness of himself, particularly since this consciousness includes an awareness of one's own finitude and potential non-being. He writes:

> The first assertion about the nature of anxiety is
> this: anxiety is the state in which a being is aware
> of its possible non-being (1952).

The crucial problem here is to understand the relation of being to non-being. If being is defined in terms of process, as Whitehead does, non-being is the negation or absence of these processes and is ontologically as basic as the former. This acknowledgement does not imply equal priority between the two. Tillich's view rests on the ontological priority of being over non-being because non-being in itself, out of logical necessity, presumes the prior existence of being. Thus, the emerging relation is that non-being is dependent upon and is contained within the condition of being, and inescapably so. This is why anxiety is a fundamental concomitant of our lives. This point is fundamentally important because of its powerful implications for psychological health and because it provides a basis for distinguishing pathological anxiety from normal or existential anxiety.

Fear and anxiety are close associates and it is useful to make a distinction between them. Tillich (1952, p. 36) writes:

> Anxiety and fear have the same ontological root but they are not the same in actuality. Fear as opposed to anxiety has a definite object which can be faced, analyzed, attacked, endured. But anxiety has no object or rather its object is the negation of every object.

In a sense, then, fear becomes anxiety when its object is an unknown. Thus fear and anxiety are immanent within each other. But an explanation of anxiety as fear of the known is not adequate for all types of anxiety for there are many realms of the unknown that are faced without anxiety. It is the unknown of non-being which an individual faces with anxiety. Arguing that any specific anxiety situation can be analyzed in these terms,

Tillich (1952, p. 42) writes:

> It is the anxiety of not being able to preserve one's own being which underlies every fear and is the frightening element in it. In the moment, therefore, in which "naked anxiety" lays hold of the mind, the previous objects of fear cease to be definite objects.

This is the pivotal point of a crisis which can lead to pathology if it is not successfully dealt with. At this point the capacity to manage anxiety becomes crucial. Ultimately, the incapacitating effect of "naked anxiety" can only be overcome by affirming one's relation and participation with respect to the eternal principles of being in the cosmos and this ultimately rests in the acceptance of ourselves as spiritual beings. It is that acceptance which turns the energy from anxiety into courage. Essentially, the management of anxiety rests in being able to convert its energy into courage. Courage enables one to confront one's weaknesses and overcome helplessness and deal with them by converting liabilities into assets. In pathological or neurotic anxiety, the person avoids confrontation and hence impairs his own development. Thus, as Tillich puts it, "Neurosis is the way of avoiding non-being by avoiding being" (1952, p. 66). Such avoidance means that many of an individual's potentialities are not admitted into actualization because actualization of being implies the acceptance of possible non-being and its concomitant anxiety.

Freud's view of anxiety rested on antagonism between instinctual drives with their blind urge for satisfaction and the forbidding social environment internalized as a superego (1936). The neo-Freudians

sought to remove the concept of anxiety from its biological-instinctual origins and explain its genesis within the context of conflicting personality trends. Horney (1946) cites the child's feeling of being isolated and helpless in a potentially hostile world as the developmental basis for these conflicting trends. Teachers who understand how this basic anxiety develops can assist children to keep it from reaching unmanageable proportions. Horney cites several factors which can give rise to insecurity of this dimension; among them are direct or indirect domination, indifference, disparaging attitudes, too much admiration or the absence of it, unkept promises, and injustices of all kinds. A typical conflict leading to anxiety in the child arises from his dependency on parents who make him feel isolated, intimidated and insecure. This will lead to hostile impulses against the parents which will have to be repressed because of the child's dependency on them. Repressed hostility disables the individual's capacity to recognize and fight real dangers and the act of repression itself further adds to the child's feeling of helplessness. Thus there is a reciprocal relationship between anxiety and hostility which results in a vicious circle. Over time, the child develops a set of attitudes and strategies which emerge as fairly crystalized personality trends of three basic kinds: (1) moving toward people; (2) moving against people; and (3) moving away from people. The first trend represents the most wholesome development. In this case, the child "accepts his own helplessness and in spite of his fears and estrangement tries to win the affection of others and to lean on them" (Horney, 1946, p. 50).

It is the job of the teacher to assist the child to develop attitudes which enable the child to move toward people rather than against them or away from them.[1]

In the second trend, the child accepts and takes for granted the hostility around him and determines consciously or unconsciously to fight to control and dominate others. In the third trend, the child implicitly mistrusts the feelings and intentions of others and wants neither to belong nor to fight, but to keep apart. Horney points out that these three basic trends exist to some degree in all persons and they are not in and of themselves pathological. The healthy inidividual is able to bring into balance the three modes of relating (dependency, control, and solitude) and integrate them into a unified structure of self. In the neurotic personality, one of these attitudes predominates in an extreme and compulsive manner. This comes about because of an inability to manage anxiety.

Other researchers and theorists have made substantial contributions to our understanding of the nature of anxiety. Kurt Goldstein (1940) defines anxiety as the subjective experience an organism has when it interprets itself to be in a catastrophic condition--catastrophic because it cannot cope with the demands of its environment and therefore feels its existence threatened. This threat may come from an attack on values the organism identifies with and may result from the breaking of bonds of love or friendship with other people.

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[1]Being able to do this represents one facet of moral competence which is discussed more fully in Chapter V.

May (1950) regards anxiety as a response to threat to the core or essence of the personality whereas fear is a response to peripheral dangers -- to threats before they get to the core. Thus by reacting adequately to the various specific dangers which threaten a person (i.e., reacting adequately on the level of fear) the individual can avoid having the core values, security system, etc.) of his personality threatened. If, however, he cannot cope with dangers in their specific forms, perhaps he is unable to differentiate a threatening element, he will be threatened at the deeper level. May uses a military analogy to explain the difference. If a battle is being fought on the front lines and can be kept on the periphery, the maintenance of integrity is possible. But when the enemy breaks through the lines and comes into the capitol of the country, inner lines of communication are broken, supply lines are demolished, the battle is no longer localized. The enemy attacks from all directions and the defending soldiers don't know which way to march or where to take a stand. This results in a threat to the core of the country.

A practical view of anxiety can be subsumed under the heading of "interruption theory". Investigators who advance this interpretation trace the source of anxiety to the interruption of organized behavioral sequences. If an organized sequence of action has been initiated by the child and it cannot be completed, there is the implication that blocking of the sequence has not been anticipated, otherwise it would have become a part of the organized sequence of actions. If at the point of interruption, the organism has no alternative plan of action or behavior available, anxiety will result. The inability to complete a sequence

and the unavailability of alternative completion sequences produces
helplessness for the individual who does not know what to do. The lack
of adequate response patterns and purposeful behavior suggest a definition
of anxiety as energy without a goal. Many teachers will recognize that
this energy without a goal very easily goes into "acting out" behavior
which becomes a disturbance in the learning situation. The kind of
assistance that a teacher can give at such points is to suggest an altern-
ative pattern to completing any action sequence and in the process help
teach the child how to manage anxiety by modifying the original sequence
and introducing alternative responses. This idea of control over interruption
is remarkably parallel to White's concept of competence and is compatible
with our definition of learning competence as the capacity to differentiate
and integrate new elements of experience in the creation of a novel unity
(White, 1959).

Our fundamental assumption about the nature of human life is that
being inheres in the process of creative evolution or concrescence. This
process is mediated by the reciprocal capacities of differentiation and
integration. As a corollary to the principle of "being is becoming through
learning", any suppression of this ongoing process must be interpreted as
a basic threat to the existence of being, the subjective experience of
which is the negation of meaning, fragmentation, the disintegration of
organized purposive activity, helplessness, and the consequent subjective
experience of anxiety. Thus, anxiety occurs whenever there is a break-
down in the fundamental and interrelated processes of differentiation
and integration or when there is differentiation without integration and

vice versa. Because anxiety precipitates a release of energy to the organism it can be the precursor of needed growth.

What do we mean by the management of anxiety? It is worth re-emphasizing the point that the management of anxiety cannot be equated with the avoidance of anxiety. The unfortunate tendency in our culture to regard anxiety and fears in a negative vein represents a very narrow-minded view of the growth process. This simplistic view stems from a failure to distinguish between neurotic anxiety, with its non-constructive avoidance strategies, and normal anxiety which can serve as a signal of internal conflict or crises and provide the impetus to reach new levels of strength and integration. To regard anxiety as undesirable removes the possibility of constructive acceptance and the use of day-to-day anxiety which cannot be called neurotic. Neurotic anxiety may be thought of as the result of unfortunate or unsuccessful learning that comes from the failure to cope with previous anxiety situations. Normal anxiety can be conceived, as indicated earlier, as a crisis of integrity which the individual directly confronts and responds to with new learning, i.e., differentiating out the incongruity which threatens the unity of the organism, and re-integrating on a new and higher level of wholeness. Thus, as Tillich and Kierkegaard would have it, anxiety inheres in the process of growth. The lifestyle of a competent learner consists of moving through anxiety-creating experiences rather than moving around them or retrenching in the face of them.

A crucial matter for teachers of children is to know what enables the child or student to face the painful experience of anxiety. Grinker

and Spiegel found in a series of studies they completed during World War II that the most constructive attitude consisted of soldiers frankly admitting their anxiety and secondly believing that backing out was ultimately a greater threat than confronting the danger of moving ahead. A person is better prepared to face unavoidable anxiety constructively when he has faith that his growth as a human being is served by moving through the anxiety experience rather than moving around it. One cannot therefore confront anxiety in a vacuum successfully. One of the constructive roles of a teacher is to help create a context within which it is believable that there is more to be gained by moving forward than backing out. Since we have observed that anxiety may be regarded as energy without a goal, helping the child to understand that settling on a goal and moving toward it is an essential antidote for anxiety in two ways: it utilizes the energy which is available on the one hand and on the other hand it brings meaning to the organism that always comes from any act of integration (i.e., seeing how things fit together in order to achieve a given objective or purpose). Ultimately, human beings must develop a sense of purpose out of which goals may be generated. This will enable them to confront the fundamental anxieties coming from death, annihilation, isolation, or help-lessness. Goals and purposes on this level cannot be formulated independent of faith and one's view of how he fits into the cosmos. It rests therefore on the development of a philosophy of life that is broader than materialistic concerns.

Management of anxiety as a process includes the following:

1. Recognition of anxiety and being able to communicate the fact;

2. Utilizing the awareness of anxiety as an adaptive warning signal indicating that a crisis of integrity may be incipient;

3. Recognizing when anxiety has increased to the point where it is interfering with efficient interaction with the environment;

4. Reducing excessive general reactivity through voluntary inhibition, i.e., relaxing;

5. Learning about the common causes of anxiety, many of which were discussed above;

6. Differentiating and bringing into full awareness the threatening crisis underlying one's anxiety and to place it into a con- structive context (i.e., to see how more can be gained by facing and working through the anxiety rather than avoiding or circumventing it);

7. Surveying and construcing alternative possi- bilities or plans to resolve the crisis; and

8. Implementing the plan and evaluating its outcome.[1]

In the ongoing course of the day, a sensitive teacher will have manifold opportunities to help a child learn how to manage anxiety by strengthening the subprocesses just itemized. In some cases, a teacher may be justified in creating a situation where mild anxiety results. This cannot only create energy available for learning, but provides the opportunity for

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[1]The management of anxiety includes many of the elements of the in- tentional process. These are more fully discussed in the next section.

understanding something about the management of anxiety as well. If this
is done, it should be borne in mind that a child who is very anxious can
use the energy from his anxiety productively only if he is asked to engage
in a number of tasks which are clear, relatively easy, and short. Asking
a child to deal with excessive levels of anxiety by giving him tasks
which are not clear, take a long time to finish, and are difficult will
only add to his anxiety and may have unfortunate consequences. Whatever
the approach, the overall objective must be kept in mind: to increase
the child's capacity to actualize his potentialities not only in spite of
anxiety but also because of it.

Volitional Competence

Four or five decades ago, volition, or will, was rejected as a
respectable and meaningful concept in the field of psychology. The
rejection created a vacuum which has never been adequately filled by
other concepts. Miller and his associates (1960, pp. 11-12) have made
note of the problem:

> Our point is that many psychologists. . .have been
> disturbed by a theoretical vacuum between cognition
> and action. . . .No doubt it is perfectly clear to the
> reader that we have here a modern version of an ancient
> puzzle. At an earlier date we might have introduced
> the topic directly by announcing that we intended to
> discuss the will. But today the will seems to have
> disappeared from psychological theory (1960, p. 11).
>
> Intention went out of style as a psychological
> concept when reflex theory and its derivatives became
> the foundation for our scientific theories of behavior
> (Ibid, p. 60).

Going out of style was inevitable because intention and volition were
thought to be incompatible with models of psychological inquiry based

on the mechanistic and reductionistic notion that man can be studied, very much like a machine, by taking apart the components which make up that machine, thereby gaining some concept of its totality.[1] Herein lies the assumption that behavior of even the most complex kind can be understood by reducing it to the simple accumulation of elements which comprise it along with the reflex habits that are programmed into the central nervous system as the result of past experiences and their reinforcement. The wholesale adoption of mechanism is understandable since, as we have noted, reductionism as a methodology has been successful when applied to other fields such as physics and chemistry. According to a mechanistic model, a person's actions should be totally predictable in terms of reflexes and variants of those reflexes, and should be directly traceable to the unique characteristics of the external stimulus conditions. What flows in through one's sensory receptors flows out as some form of predictable behavior based upon the characteristics of what flowed in. Sensory data alone, however, are inadequate to explain even the simplest forms of human behavior.[2] The vast number of complex interchanges occurring

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[1]Scientists have now come to realize that even a machine can't be understood apart from the purpose the designer had in mind when inventing it because the operational principles of a machine are derived from its purpose and not from some inherent quality in its parts. Polanyi (1958) makes the point: "The first thing to realize is that a knowledge of physics and chemistry would in itself not enable us to recognize a machine." Scientists can describe the parts of a clock, for instance, "in every particular, and in addition will predict all its future configurations. Yet they will never be able to tell us that it is a clock. The complete knowledge of a machine as an object tells us nothing about it as a machine." We must know its purpose first and the operational principles derived from that purpose. Thus the reality of the machine cannot be grasped apart from its purpose; the purpose of something represents its characteristic power.

[2]Thomas Ryan's book (1970) is devoted to a detailed explanation of why SR Theory is inadequate to account for human behavior and why the notion of intention and purpose cannot be dispensed with.

within the organism between stimulus and response are related to the "meaning" aspect of human activity without which we cannot understand human behavior. Central to those activities within the organism that occur between stimulus and response is purpose -- a necessary character-istic of any human activity.[1] Whitehead holds that purpose is an element of causality just as physical forces or genetic inheritance are part of causality: "the conduct of human affairs is entirely dominated by our recognition of foresight determining purpose, and issuing in conduct." For scientists to ignore this evidence of purpose is considered by Whitehead to be "a colossal example of anti-empirical dogmatism arising from a successful methodology (Eisendrath, 1971). Whitehead's cosmology relies extensively on the notion of purpose as a vital element in the constitution of reality. He refers to purpose as an aspect of subjective aim, which guides and directs the process of concrescence. The function of purpose as an expression of subjective will is implicit in our very existence. It is a higher-order operation that gives man greater choices within a wider boundary of situations and enables him to be transcendant by projecting himself beyond the limitations of the present moment. A simultaneous fusion of past and present with the future -- an incorporation of purpose, ideals and aspirations into the immediate situation -- creates the condition of transcendance and enables the subject to leap beyond, to become liberated from, that immediate

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[1]Charles Taylor (1964) makes the point that all descriptions of behavior by scientists contain teleological or purposive elements and that there is no way of avoiding it.

situation. It is through the operation of purposive experience, the

bringing to bear of one's sense of purpose upon the immediate situation,

that underlies the act of volition. We therefore define volitional

competence as the capacity to form ultimate aims at the leading edge

of one's life, the infusion of purpose into the perpetual flow of

experience expressed in operable goals and intentions which determine

action. Will or intention is implicit in action. Lewis states the

case:

> All acts have in common the character of being intended
> or willed. But one act is distinguishable from another
> by the content of it, the expected result of it, which is
> here spoken of as its intent. There is no obvious way in
> which we can say what act it is which is thought of or
> is done except by specifying this intent of it
> 1946, p. 367).

Functionally, then, volition is inherent in a sense of purpose derived

from ultimate concerns and is translated into operable goals or intentions

expressable through some form of action.

We have identified several processes germane to learning competence

which are central to the development of volitional competence. Following

are brief descriptions of these volitional processes.

Attention

William James succinctly defines the essence of will as action

following vision. In so doing he implicates the purposive control

of attention as the central process underlying volition. He

writes, "attention is the first and fundamental thing in volition. The

essential achievement of the will in short . . . is to attend to a dif-

ficult object and hold it fast before the mind" (1890). We might at

first feel apt to dismiss James' account as naive and uninformative
and excuse it as an artifact of a pre-scientific psychology. But some
70 years later Rollo May (1969, p. 220) was to concede:

> . . . when we analyze will with all the tools modern
> psycho-analysis brings us we shall find ourselves
> pushed back to the level of attention or intention as
> the seat of the will. The effort which goes into the
> exercise of will is really effort of attention; the
> strain in willing is the effort to keep the conscious-
> ness clear, i.e., the strain of keeping the attention
> focussed.

We are inclined to agree with this view. Regardless of which way we
approach it attention appears to be a prerequisite to all other volitional
processes.

The research literature abounds with various definitions and models
of attention but there has been relatively little effort directed towards
understanding how these various approaches might interrelate to yield
a broader and more complete perspective. After a careful and extensive
review of the literature we assembled what seemed to be a working
definition sufficiently coherent and comprehensive to integrate the
diverse views. In brief, we define attention as the process by which
an individual purposively selects (differentiates) and constructs
(integrates) the sensory and conceptual data of his immediate present
into a unity of conscious experience. It is worth re-emphasizing that
purpose is the fundamental element continually underlying the coherence
and direction of this process. As a process, attention depends upon
the continual penetration and transformation of the subjective environment,

the advance of consciousness into novel realms. Research demonstrates that if this condition of flux and transition stalls, if the interaction between subject and data subsides into stasis, attention will disintegrate. This fact holds some far-reaching implications for the organization and content of school curricula. There is substantial evidence that without attention many forms of complex learning either cannot take place at all or else proceed very inefficiently; yet, we continue to subject children to passive, inert conditions, reducing both their capacity to attend and their will to learn. Educational experiences should be designed to foster the type of interaction between the child and his environment which leads to the vital experience of penetration and adventure -- the creative advance into novelty. Once attention, the primary phase of purposive activity, begins to emerge, the stage is set for goal setting.

<u>Goal-setting</u>

This is the process of anticipating and organizing one's future by making a conscious decision about future events or aspirations; it is quite another to translate them into operable terms so that these aims might become actualized. Thus goal-setting requires one to bring into clear figure alternative courses of action by which the desired goal may be realized, project the consequences, and evaluate the feasibility of the remaining alternatives. Once the priorities of the latter have been established it remains for one to integrate them into a coherent plan of action. Finally the individual must decide

upon and commit himself to the plan of action. This act of decision and commitment is most crucial -- without it, a person's intentions and plans are ineffectual. It requires faith and confidence both in the correctness of the goal and in one's ability to achieve it. On another level, it means actively refusing to entertain other plans until either the goal is achieved or unforeseen consequences make it apparent that achievement is either impossible or undesirable.

We have been describing in general terms the various operations involved in the goal-setting process as if the content were irrelevant. But this is not the case. Process is meaningless without content as is content without process. Thus, there are several important qualitive aspects of goal-setting we should keep in mind.

First, competent goal-setting should lead the individual toward the release of his potentiality at an optimum rate. Secondly, one's goals should provide a degree of novelty and challenge to the organism. And finally, one's goals should avoid leading to destructive results for others as well as oneself. This implies that biological, psychological, and spiritual needs should be taken into consideration when goals are set.

Research has demonstrated that setting goals has a definite effect on achievement. It is known, for example, that people who set goals achieve more, and that there is a direct positive relation between the specificity of the goal and the individual's ultimate performance with respect to it. Studies documenting this have shown that even in cases where very specific though difficult goals are set, a higher

level of performance results than when the goal is articulated in vague terms such as "do your best".

Will

Will is the process of bringing a goal into fruition, the realization of intention in action. The component subprocess of will are self-arousal, perseverance, and effecting closure.

Self-arousal

The ability to move oneself from a state of rest to action -- making a beginning -- constitutes self-arousal. The complement or reciprocal to this function is self-restraint which involves inhibiting a tendency or impulse to act -- to forebear action toward a particular end which is at variance with one's ultimate aims and well-being.

Perseverance

The process of maintaining appropriate efforts toward the actualization or integration of some consciously adopted goal or intention when resistance is encountered is defined as perseverance. In any situation where one's aspirations bring one to the frontier of his knowledge or development, the actualization of potential often requires sustaining an intense degree of effort on a continual basis. However, it is precisely when one is pressing upon these frontiers of being that he is most intensely engaged in the act of becoming. Thus, perseverance plays a vital role in those levels of learning maximally involved in the release of human potential. Accordingly, from a Whiteheadian perspective, perseverance may be conceived of as the pressing force of purpose on the threshold of novelty. As the maintaining phase of purpose, it implies an apprehension of personal efficacy upon one's future, i.e., a sense of expectancy and control. Its intensity depends upon the strength of

the underlying intention and the extent to which one is able to attend or focus upon the circumscribed aspects of the situation relevant to the particular activity.

It is important that any conception of perseverance, or any volitional process for that matter, be firmly based upon its organic nature as a process inextricably related to the total process of actualization. To attempt to understand it by abstracting and isolating the notion from this context is to completely lose sight of its meaning. It should also be clear at this point that the concept of perseverance simply cannot be reduced to any characteristic behavioral pattern without resulting in triviality. For example, perseverance does not mean mere repetition or rote activity. In some cases it may involve giving up or yielding one course of action in order to try another approach to the same problem. Or it may mean stopping altogether -- acquiescing -- when further pursuit of an activity appears to be futile or destructive to one's ultimate aim.

Effecting Closure

Bringing intentions to successful consumation -- completing or resolving the task at hand -- is the essence of closure. People totally lacking in this capacity are unable to bring a sense of wholeness and integrity to their encounters with life because their efforts are fragmented. Consequently their capacity to meet the challenges of growth and achieve self-determination are severely impaired.

Fantasy

Several paragraphs earlier we suggested that attention is at the basis of every volitional process. One way in which attention underlies and sustains will is in the form of fantasy. Fantasy is merely a mode of attention in which the data are potential rather than actual. Being able to fantasize or project oneself into the intended situation energizes and motivates one to action. As James pointed out, if an exciting idea is brought into the focus of attention, unobstructed, action will automatically follow.

In summary, it is our contention that volition is a vital process underlying the release of human potential and therefore must become a central concern within any educational model that takes seriously the task of fostering the creative growth of the full range of capacities folded within every human being. Mankind now has the technological power to shape dramatically his environment. We cannot relegate the evolution of his individual and collective existence simply to the external conditions impinging upon him. Man is a purposive being and his sense of purpose is the primary element which enables him to shape his future. The ability to move forward rests on his ability to transcend the present. Purpose and will, the basis of this transcendence represents at once the fulfillment of the present by going beyond it. It is, in essence, the creative advance into novelty.

Creative Competence

Given the admiration and respect mankind has for creative genius, it is strange that research interest in creativity is of such recent origins. Prior to 1950 there were very few books and articles on creativity and most of them were of a descriptive nature rather than research oriented. Since then, an enormous literature has accumulated. It may be divided into a number of categories according to emphasis or focus, as follows: creative individuals and their personalities; nature of the creative experience and conditions which seem to foster it; products -- those things produced by creative people; and, processes which seem to underlie creative activity. Since our model is a process-oriented one, our reference to the literature will be restricted primarily to the latter category -- studies dealing with the creative process.

In the early fifties, J. P. Guilford and his associates began to evaluate a structure-of-intellect model that concerned thinking operations, two of which had to do with the production of further in-formation. He called these processes convergent thinking and divergent thinking. The former kind of thinking converges upon an answer more or less determined by premises on which the thinking is based. Divergent thinking may start from a single point and then spreads out. It diverges, searching for data that may be only remotely related to the original starting point. For a number of theorists and researchers, divergent thinking came to be regarded as synonomous with creativity.

Through factor-analytic techniques, Guilford isolated a number of sub-processes which make up divergent thinking: word fluency, associational fluency, ideational fluency, expressional fluency, spontaneous flexibility, adaptive flexibility, redefinition, and originality (1951, 1957, 1959, 1963, 1964 and 1967).

E. P. Torrance and Getzels & Jackson have followed through on certain aspects of Guilford's work with their own studies. Torrance defines creative thinking as "a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, etc.; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies, testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results" (Torrance, 1966, p. 6). Getzels & Jackson define creativity as a "fairly specific type of cognitive ability reflected in performance on a series of paper-and-pencil tests. . . our tests of creativity involve the ability to deal inventively with verbal and numerical symbol systems and with object-space relations. What most of these tests had in common was that the score depended not on a single pre-determined correct response as is most often the case with the common intelligence test, but on the number, novelty, and variety of adaptive responses to a given stimulus task " (Getzels & Jackson, 1962, pp. 16-17).

One of the most provocative findings that emerged from the work of Guilford, Getzels, Jackson, and Torrance was the relative independence

of creativity from intelligence. Wallach and Kogan have challenged
those findings by demonstrating that, in the case of Guilford's
work, divergent thinking as a whole does not seem to be distinguishable
from convergent thinking. After examining the Getzels and Jackson
study carefully, they concluded that "the only characteristic which
the kind of creative battery under consideration can measure with
any reliability is none other than general intelligence". However, a
detailed examination of the tests used to determine creativity revealed
that there were some aspects of the tests performance on which yielded
scores that did not correlate highly with scores on general intelligence tests.
Wallach and Kogan found that associational fluency, one of the processes
identified by Guilford which refers to the ability to generate words
that meet particular semantic criteria (such as finding a word which
has the same meaning as each of a pair of words that in themselves are
different in meaning) was the one process which did not correlate
significantly with performance on general I.Q. tests. Furthermore,
that same process, associational fluency, was included as one of several
processes designed to distinguish creativity from intelligence in both
the Torrance tests and the Getzels and Jackson tests. When scores on
the associational fluency parts of the test are singled out, they are
relatively independent of general I.Q. scores. Wallach and Kogan
concluded that associational fluency seemed to define the kind of
cognitive functioning that was most clearly independent of convergent
thinking, the kind of thinking measured by traditional I.Q. tests.

During the last few years, a great deal of research has concentrated on associative processes and their relationship to quantity and novelty (Mednick, 1962; Maltzman, et. al., 1964; and Maddi and Andrews, 1966). From these studies, the major defining property of creativity is the process of generating associates without regard to evaluating them for their applicibility or relevance to a given task, provided these associates appear in relative abundance. The ability to generate associates without regard to relevance to a given task seems to be related to what has been called "incidental cue utilization" and attention deployment to the periphery of concerns rather than to the core. Wallach and Kogan also found that the production of abundant associative content was related to a playful and permissive task attitude on the part of the creative person. Other studies have demonstrated a relative permissiveness and open-free play as essential preconditions for the development of creativity. Research has also found evidence of a correlation between associational creativity and fantasy, and a correlation between fantasy production or daydreaming and creativity as measured by novelty of responses on projective tests such as the Thematic Apperception Test. This might be expected since spontaneous fantasy of the daydreaming kind is not tied to a specific task. For this reason there can be breadth in the deployment of attention. Furthermore, while correlations between scores on tests of manifest anxiety and intelligence tests are found to be negative or zero, there is a correlation between anxiety and scores on fantasy and associative tests. This should be no surprise

in light of the nature of anxiety and its role in the release of human potentiality as discussed in the section on affective competence.

How do these findings fit into the definition of creative competence within the Anisa Model? From the Whiteheadian perspective, no growth takes place without creativity. From this view, all children and human beings are creative; each act of learning is in a sense an act of self-creation. If the common-denominator of all learning is the capacity to differentiate and integrate, we will then logically expect those twin processes to be at the heart of creativity and creative competence. From this point of view everyone is a perpetual creator so long as he is a perpetual learner and the more competent learner will also be the more creative person. In terms of the research just cited, the processes of differentiation are focused on peripheral areas not concerned with the given task so that when integration takes place it includes sources of data not ordinarily considered by a less creative person. This involves processes of differentiation from both external sources of data (such as different kinds of stimuli coming from places that are peripheral to all given areas of concern) and internal sources of data outside of stored facts such as daydreaming or fantasies. Since daydreams and fantasies are largely beyond conscious control, it follows that they would reflect a broad deployment of attention thereby producing unique associational bonds, there being no task involved that would require some kind of convergence. Thus, creativity

from our point of view means drawing on a wider source of data or experience for differentiation which eventuates in new or unusual integrations. This provides a definition of broad usefulness and application and gets around a number of serious limitations of many of the studies carried out including those just cited. With the exception of the studies on fantasy, the bulk of the studies concentrate on thinking. Yet, we feel compelled to say that there are creative ways of feeling, creative ways of relating to other human beings, creative ways of perceiving, and that psycho-motor competence and volitional competence will also have their creative aspects. Thus the more creative a person is in any of these areas, the more competent he becomes. It is difficult if not impossible to think of intelligence as something apart from learning competence.

If we view intelligence in terms of learning competence as we have defined it, then intelligence will include creativity and intelligence tests will have to be substantially revised to take that into consideration. As intelligence tests stand now, they are product-oriented rather than process-oriented and they focus heavily on convergent kinds of thinking. If we want to broaden the definition of intelligence to mean general effectance, then I.Q. tests will have to measure learning competence in areas other than cognition. We predict a trend away from the use of standard I.Q. tests as a primary means of assessing intelligence and that the definition of intelligence itself will become broadened to include psycho-motor,

perceptual, volitional, affective, and creative abilities.

We have identified a number of processes which contribute to the ability to differentiate and integrate in the ways characteristic of creativity. Among these are the toleration of ambiguity, intuition, broad deployment of perception, humor, imagination, speculation, metaphor, analogy, fantasy, and management of inhibition; the first two are discussed below, followed by a list of practical suggestions for teachers.

Toleration of Ambiguity

Ambiguity arises when meaning is not clear. Meaning depends upon grasping the relationships among parts that are integrated into a whole. Since the first part of any creative act has to do with differentiation -- selecting data from a wide variety of sources -- there is no possibility of having meaning, taken in this sense, at the beginning of a creative task. To have clarity at the beginning of a task is to have the end at the beginning. But if one has the end at the beginning, there is no reason to begin in the first place. Part of the ability to tolerate ambiguity is the ability to proceed on some tentative basis. The less creative person finds it difficult to adopt anything on a tentative basis. His habitual reaction to tentativeness is hesitation which usually stretches into procrastination.

From a perceptual point of view toleration of ambiguity means that the creative person can withstand the pressure to integrate all of his percepts into a concept prematurely. Being concept-bound inhibits creativity because it impairs wide deployment of attention which brings diversity to the elements being differentiated. Being

able to pay more attention to percepts initially is therefore very important. Kline (1907) refers to the concept-bound as "levelers" whereas "sharpeners" allow currently-held concepts to have less influence on them as they survey the environment, internal or external. Hughes (1969) describes a sharpener as one with unlimited curiosity who is quite willing to make "bold leaps into uncharted territory". A person who is not concept-bound is free to focus attention in a wide variety of directions simultaneously. This is a form of divergence which leads to the discovery of many alternatives which provides the abundance of material which can then be examined in relationship to a given task in preparation for convergence and task solution. Parnes (1971) suggested that this kind of divergence results in the discovery of many alternatives.

Intuition

Bruner (1963, p. 58) distinguishes intuitive thinking from analytical thinking in that the former does not advance in careful, well defined steps. Intuition appears to involve a kind of scanning followed by a sudden integration of elements heretofore unrelated.[1] Intuitive thinking frequently depends upon overlearning -- a thorough knowledge of a given discipline and its related disciplines. From this point of view it appears as a kind of confident guess which, of course, must be checked out by the usual methods of proof in those cases where science is concerned. But intuition certainly works in areas other than thinking. for instance, persons are often gifted intuitively where human relations are concerned.

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[1]In his Transcendental Aesthetic, Kant emphasized that intuition is an integration -- when many complex data are "intuited" as one.

Generally speaking, teachers may facilitate the development of creative competence in children by supporting and encouraging the following:

1. Deferring judgment (associated with the toleration of ambiguity);

2. Organize testing in a way that does not reinforce and emphasize convergence only;

3. Avoid punishing fantasy or daydreaming (though guiding a child to return from excess daydreaming may be necessary);

4. Emphasize process rather than product (although products must be evaluated, too);

5. Guide permissive play rather than punishing it;

6. Avoid intense argument and heavy criticism, particularly during the initial states of creative activity;

7. Encourage the production of quantity without regard to quality in the initial steps (it is important here to not give the child the idea that quantity is the sole criterion for determining excellence; quantity is needed in the initial stages of any creative effort);

8. Support any activity that involves differentiating attributes of any object, event, or idea. (This is a form of differentiating which is prerequisite to any creative act);

9. Encourage the use of metaphors;

10. Encourage speculation and guessing at appropriate times;

11. Avoid continual spirit of competition (this usually stresses convergence, and immediate judgments, both of which impair creativity);

12. Avoid routine approval of conformity behavior just for the sake of conforming;

13. Encourage children to select their own problems and projects (the teacher who demands that the children abide by her wishes on all matters is not encouraging a broad deployment of attention);

14. Avoid being authoritarian;

15. Introduce paradoxes to stimulate curiosity;

16. Avoid making premature closures on activities;

17. Use questions which confront the child with ambiguities or uncertainties (questions which cause the pupil to look at something from a different perspective; questions which require speculation and development of hunches; introduce mysteries and puzzling phenomena and ask questions about them; ask questions that stimulate fantasies); and,

18. Encourage humor (laughter is a response to an unanticipated and therefore novel arrangement or integration of items or events. The first part of a joke, for instance, leads one to expect a particular conclusion or outcome; the punch line produces an unanticipated integration and we laugh. If someone doesn't grasp the novel integration we say that he doesn't "get" it. We sometimes laugh on such occasions , but it will be a faked laughter. Being around people with a good sense of humor facilitates creativity).

Though all of the above items listed are important in facilitating creativity, none is so important as the teacher himself being a creative human being. The efficacy of learning through modeling has already been demonstrated. Children in the presence of a human being who is creative have a good chance of becoming creative themselves.

Memory

In order for experience to have cumulative effects in the development of human potentialities, there must be some means of storing and retrieving traces of those experiences. Getting information into long-term storage is one process, retrieving it is another. It is apparent that a great deal of information which we store is not easily retrievable and may never be retrieved. If we can't retrieve something we say we have forgotten it. There are now known various ways of insuring that something which has been stored can be retrieved. Basically, it is essential that when something is stored, it must have an "address" or location so that we can get back to it. Studies have also begun to identify factors which impair memory, such as proactive and retroactive interference (Hunter, 1964). Retroactive interference refers to the way in which material being currently processed interferes with material that has already been stored. This is usually a function of the similarity between the original material and the material subsequently stored.

Proactive interference refers to material that has already been stored
interfering with the accuracy of new material which is in the process of
being stored. A good deal of confusion is experienced by children when
material is presented to them in ways that make proactive and retroactive
interference possible.

One of the most important factors in efficient memory is the organization
of material at the time of being exposed to it. Disorganized material
is extraordinarily difficult to store and even more difficult to retrieve.
Furthermore, studies have shown that the memory span is a fixed number
of "chunks", somewhere between five and seven. A "chunk" may be
regarded as a unit of memory -- material presented which forms the
largest coherent and meaningful whole. For instance, NWFRO may be
considered five chunks and hard to remember. But if we rearrange them
into FROWN, it now represents one chunk, which is easy to remember.
NWFRO is FROWN in a differentiated state; FROWN is NWFRO in an integrated
state. Miller (1956) uses the term "recoding" to indicate the
process by which it is possible to manage larger and larger units,
or chunks. In essence, this is the process of finding a way of inte-
grating differentiated items. Studies have demonstrated that the way
in which separate items are integrated into wholes is one of the chief
factors in efficient memory and storage and retrieval. It seems to
be no accident that we frequently confuse memory with learning; they
are intimately connected. For this reason, it should be no surprise
that the same processes underlying learning competence should also have
a role to play in storage and retrieval competence.

A sizeable body of literature has now been developed on the nature of memory, what facilitates it, and what impairs it. This information is now being researched and tabulated for its practical utility in training teachers so that teachers can arrange environments for children and direct interaction with it in ways that facilitate rather than impair memory.

Evaluation

A lack of research and evaluation in program development and modification is a weakness common to most educational systems (Hawkridge & Chalupsk , 1969, p. 8). Typically, program evaluation is based either on the opinions and intuitive insights of experienced teachers and administrators or on the empirical trial-and-error method where practices which appear to be successful are maintained and those which appear unsuccessful are discarded. While these two approaches shouldn't be disparaged, individually or together they do not comprise an adequate approach to educational planning. Continual research and evaluation coupled with intuitive judgments are essential for ongoing program modification and improvement. But evaluation cannot exist in a vacuum; it, too, must be derived from and consistent with a philosophy and objectives generated out of the philosophy.

The research which forms the basis for the Anisa model suggests that the superordinate educational need common to all human beings is to learn how to learn. The operational aspects of the model are therefore defined by specifications on the processes in each area (psycho-motor, perceptual, etc.) which underlie the development of learning competence. Each specification explicates one of the processes and translates the definition of the process into a corresponding educational objective. These

objectives form the basis for much of the model's evaluation and projected research.

The question of how the objectives should be stated is a debated issue in educational circles with advocates supporting both sides of the argument as to whether or not objectives must be operationally stated. To take the extreme position in either direction would, in our estimation, be a mistake. When possible, objectives should be operationally stated because this enables one clearly to ascertain the extent to which the objectives have been met. On the other hand, all human functioning does not necessarily manifest itself immediately or directly in observable behavior. To direct one's attention only to what can be operationally stated would be to ignore vast portions of the model which either can't be readily stated in behavioral terms or operationally defined. This is particularly true for processes in the affective area. In the case of the latter, more general and impressionistic goals accompanied by sub-jective evaluation and intuitive judgments will have to be accepted. While some areas of learning competence can be evaluated by the use of existing tests, there are no instruments available at present for asses-sing the processes of other areas. For example, no tests for measuring volitional competence exist. Part of our future research effort will be to develop effective instruments for assessing those areas for which there are no adequate means of measurement at the present time. Further-more, since many of the existing tests are product-oriented rather than process-oriented, revisions will have to be made and tested out.

While normative data from achievement and intelligence test results may be gathered at certain intervals and used in assessing the overall effectiveness of the program, our major concern will be the extent to which each child, according to his unique capacity, is becoming a competent learner. Therefore, in terms of individual progress we would put less emphasis on the use of achievement tests and greater emphasis on criterion measures pertinent to each specification of learning competence. It is important to emphasize that testing viewed within the philosophy of the model is not used as a means of recording youngster's failures, but rather as a way of identifying sensitive periods or deficiencies in skills yet to be addressed. It is the purpose of education to assist children to turn liabilities into assets by viewing "failure" in this significantly different way. Many children fall into what one might term a "failure syndrome" which can be so devastating to the child that it precludes any further attempt on his part to tackle the challenges that he has "failed" to meet. If scientists had fallen into a failure syndrome, we would have only a small fraction of the tremendous discoveries and inventions we now enjoy. Scientists often experience thousands of failures before there is a sudden breakthrough, usually because of having learned from the many mistakes of the past.

The major purposes of evaluation are diagnosis of individual needs and modification of the educational program. Of particular importance is assessment of student progress for the purpose of achieving a more effective individualization of instruction. Assessment of evaluation can be used to find a way of diagnosing the appropriateness of certain

learning experiences and how they might be modified to become more effective for a given child. It is also important to use data from tests to give the child feedback on how he is doing and to specify those areas where difficulties lie and special efforts are needed. This information is also helpful to parents who are also working to help their youngsters to become competent learners.

The collective data that come from all the areas of assessment should reveal how well the program is succeeding in reaching its goals. Normative data from intelligence tests and achievement tests will be useful since we recognize the importance of content even though there is a great deal of emphasis on the processes of learning.[1] Evaluation of individual progress and program effectiveness guides the process of modification and thus constitute the basic means of self-renewal of the educational system.

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[1]Since the cultural biases typically present in both types of tests make them inadequate as fully trustworthy instruments for evaluation, they must be used with caution.