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Role of Nutrition in the Actualization of the Potentialities of the Child:

An Anisa Perspective

Since the inception of Head Start Projects during the summer of 1965, preschool education has become a major component of the publicly-supported educational venture in this country. Though we have learned a great deal from this experience, it will probably be several decades before we obtain a systematic and scientific understanding of the critical biological, psychological, and cultural determinants in the actualization of the child's potentialities. Educators can ill afford to wait that long. It is essential that we utilize to the best possible extent what is known to date about child growth and development to formulate an empirically-supported theoretical and conceptual framework for generating preschool curricula and teacher training programs.[1]

Even a cursory examination of the theoretical underpinnings of the major preschool programs will confirm Gordon's observation that "educators and psychologists do not have common sets of beliefs once they move past the broad generalizations contained in the transactional statement such as 'learning is a function of interaction between an organism and an environment' " (1971, p. 12).

[1]A 1972 survey revealed over 200 preschool curricula in existence in various stages of conception and implementation in this country. For an excellent review of the theoretical bases of some major intervention programs, see R. Parker, ed., *The Preschool in Action* (Boston: Allyn & Bacon, 1972).

Theoretical Base for Intervention Programs and the Anisa Theory of Development

Proponents of major early intervention programs are coming to recognize the power of a well-articulated theory of development and learning in that it offers an overarching framework for all educational planning, pinpointing goals and objectives, while at the same time giving direction to intervenors[2] in their efforts to make educational decisions on a day-to-day basis. Such a theory is indispensable as one moves from philosophy to practice, from levels of abstraction to levels of operation. Bruner states:

> Theories of development are guides for understanding the perfectability of man as well as his vulnerability. They define man's place in nature and signal opportunities for changing his lot by aiding growth. A theory of development that specifies nothing but intervention is blind to culture . . . . One that specifies only intervention is blind to man's biological inheritance. (1972, p. 23)

It is evident that the coherence and efficacy of any intervention program to a large extent lies in the comprehensiveness of its theory of development. Yet, some of the available developmental theories are outcomes of piecemeal efforts, hastily conceived, incoherent, and oftentimes contradictory. Solving this problem requires a broader conceptual framework which will integrate purposefully all that is known about human growth and development. This broader framework can be found in a philosophy which contains the most comprehensive view of the nature of man. To be comprehensive in its scope a theory of development must emerge from such a philosophical base—one which explicates the nature of man, his purpose and potentialities, and how he comes to know, feel, and act.

Consequently, when the Anisa model[3] was being conceptualized, the need for articulating such a theory became evident and therefore was the first order of business. Drawing heavily on Whitehead's philosophy of organism, the Anisa model views man as a creature at the apex of creation whose reality essentially inheres in the process of his becoming—translating his unlimited potentialities into actuality (Jordan and Shepard 1972). From this philosophical base, the Anisa theory of development defines development as the process of translating potentiality into actuality—a process initiated and sustained by interaction of the organism with its environment. While a full explanation of the theory is beyond the scope of this paper, it would be pertinent to focus on a few of its unique aspects that are relevant to our discussion.

First, there is in the Anisa theory of development a healthy departure from the age-old nature-nurture controversy which centers around an attempt to assign more importance to either heredity or environment. The Anisa approach concentrates on the more productive quest of understanding "how the expression of the genetic endowment presupposes environmen-

[2]An intervenor is one who is involved in aiding the actualization of the child's potential, e.g., the parent, teacher, aide, support staff, school administrator, curriculum specialist.

[3]For a comprehensive overview of the Anisa Model, see D. C. Jordan and D. T. Streets, *Young Children* 26, no. 5 (June 1973): 289-307.

tal influences and why the nature of the environmental pressure cannot be understood apart from the genetic predisposition of the organism and the modification of the environment due to the organism's presence in it" (Kalinowski and Jordan 1973, pp. 19-20).

Second, the theory recognizes two broad, mutually dependent, and inextricably interwoven categories of potentialities—biological and psychological, identifies nutrition as the key factor in the actualization of the biological potentialities, and fixes learning as the fundamental factor in the development of the psychological potentialities.[4]

Role of Nutrition in Achieving Learning Competence

While the role of nutrition may be self-evident to researchers in the biomedical disciplines, it represents a major concept for consideration by those whose interests are either directly or indirectly related to the academic performance and behavior of the child. Until recently, both psychologists and educators have neglected the area of nutrition. Not only is proper nutrition essential for the maintenance of the biological integrity of the organism but it also serves as a fundamental prerequisite for the actualization of psychological potentialities. In other words, the possibilities of learning depend in the first place on the existence of a sound physical and neurological base. Therefore, the integrity of the child as a biological organism on the one hand, and the characteristics of the environment on the other, define and determine the child's functional capacities. No intervention program will be comprehensive if it concentrates merely on enriching and reconfiguring the intellectual, social, and cultural environment without providing the optimum conditions in the microenvironment of the child for maintaining his or her own biological integrity.

While a comprehensive review of the research in the biomedical sciences related to the deleterious effect of malnutrition on the growth, development, and performance of the human organism cannot be undertaken here, enumerating briefly some of the findings that are relevant to education will be useful.[5] It has been established that there are certain periods of vulnerability in the early development of the human organism during which the presence or lack of a developmental modifier causes a significant alteration in the course of normal development. During periods of rapid growth, the organism is particularly vulnerable to nutritional injury. In fact, there is strong evidence that critical periods which ultimately determine the full expression of human potentialities extend over a time continuum starting at conception and going well beyond the preschool years. The effects of inadequate nutrition on growth and mental development depend to a large extent on the point in the continuum at which the deprivation occurs, the severity and duration of the deprivation, and

[4]The psychological potentialities are categorized as psychomotor, perceptual, cognitive, affective, and volitional.

[5]For further details see: S. Pattabi Raman, ed., *Nutrition, Development, and Learning,* selected readings (New York: MSS Information Corporation, 1974).

the nutrient of which the organism is deprived. Considering all the developmental influences that humans experience, those that occur during the very early years of life have the most profound effect. This early period of susceptibility includes pre- and postnatal life because the human body and the brain are incompletely differentiated at the time of birth and they develop as the infant responds to environmental stimuli. During this period, the central nervous system is on a different time scale of growth from that of the rest of the body. The brain grows most rapidly during the pre- and postnatal periods.

No educator would deny the critical role of intersensory integration in the acquisition of early sensorimotor and manipulative skills which are fundamental prerequisities for cognitive, language, and socioemotional development. But how many educators are aware of the part played by nutrition in achieving such an integration? Longitudinal studies conducted in countries where protein calorie nutrition is endemic (Cravioto 1966) showed that poor intersensory integration was one of the most common symptoms found in children suffering from this deficiency. Poor intersensory integration also affects the maturation of the organs of perception and the abilities on which they depend—visual, auditory, and kinesthetic — all of which are heavily implicated in achieving reading and writing skills. If the development of these abilities is uneven due to early malnutrition, children will come to school with a significant handicap in learning how to read and write. To this extent, poor intersensory integration is a suppressor of psychological potentialities because it impairs ability to learn.

Even though there is research evidence to indicate the extraordinary plasticity and malleability of the human infant and his or her capacity to learn, one should not take this resiliency exhibited during the early years of development for granted. An example from the contributions of developmental neurobiology to our understanding of language development may be cited. Lenneberg (1969) indicates there may be a critical period for language acquisition related to brain growth.

> A survey of children with a variety of handicaps shows that their grasp of how language works is intimately related to their general cognitive growth which, in turn, is partly dependent on physical maturation and partly on opportunities to interact with a stimulus rich environment . . . major milestones for language development . . . . Neurological material strongly suggests that something happens in the brain during the early years that changes the propensity for language acquisition. We do not know the factors involved, but it is interesting that the critical period coincides with the time at which the human brain reaches its final state of maturity in terms of structure, function, and biochemistry. (p. 639)

Apparently the maturation of the

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brain signals a decrease in the plasticity of the human organism and locks certain functions into place.

Whatever its ultimate effect on the condition of the brain, malnutrition interferes with the child's motivation, ability to concentrate, and ability to learn. One of the most palpable clinical manifestations of severe early malnutrition found in children is a striking combination of apathy, irritability, extreme nervous tension, and listlessness. This apathy inhibits volitional competence as the child does very little as a result of his or her own will or intention. Apathy itself is a state of nonmotivation. Unresponsiveness on the part of the child characterizes his or her relation to people as well as objects. When relationships with other people are affected, development of moral competence may also be affected. This ultimately leads to impairment of all other competencies, the consequences of which are later reflected in the formation of the child's attitudes and system of values.

Thus evidence is fast accumulating in support of the view that undernutrition interferes with the development of the central nervous system and has effects on performance which include (a) loss of learning time, (b) impairment of learning during critical periods of development, and (c) changes in the individual's motivation and personality. These findings represent a major contribution to the knowledge base required by the planners of intervention programs. Trying to understand more fully the performance of the central nervous system as it relates to intelligence, memory, learning, and behavior ranks among the major challenges faced by psychologists and educators of today.

Even if the central nervous system has developed normally during the early years, nutritional deficiencies during the subsequent years can severely impair the neurophysiological bases for learning and behavior. Learning competence is defined by the Anisa Model as the conscious ability to differentiate, integrate, and generalize experience. Such ability is necessarily mediated through the central nervous system. Impaired functioning of this system at any time for any reason will therefore affect learning competence. Learning deficits and abnormal behavior may also result from brain dysfunction due to genetic and/or congenital defects.[6]

Nutrition and Emotional Disturbances

A child whose reactions to life situations are personally unrewarding and so inappropriate as to be unacceptable to peers and adults is labeled emotionally disturbed (Pate 1963). In an educational setting the emotionally disturbed child usually disrupts the class, places undue pressure on the teacher, and elicits the kinds of responses from others that further the child's emotional disturbance. Emotional handicaps, however, have their origins in certain physiological deficiencies and/or psychological maladjustments;

[6]Besides the inborn error of metabolism, phenylketonuria, recent research has raised the possibility that certain other kinds of congenital faulty metabolism may cause language and speech disorders. *Histidenemia,* a condition of abnormal metabolism of one of the essential amino acids, histidine, results in two problems: one in articulation and the other in language, due to the inability of the tongue to perform certain movements hitherto considered an orthodontic problem (Witkop and Henry 1963).

there is no one cause of childhood emotional problems.

Advances in biochemical psychiatry, neurology, and physiological psychology have increased our appreciation of the critical role of the central nervous system. Current or antecedent nutritional injury can cause many behavioral aberrations. Pyridoxine deficiency, for example, causes severe irritability and uncontrolled convulsive seizures (Coursin 1966). Malnutrition during the formative periods of the central nervous system can cause maturational lag in neural development, resulting in lack of cortical control due to a corresponding delay in maturation and improper functioning of the endocrine system and the neural mechanisms that control emotions.

Often "psychological malnutrition," called "marasmus," is due to an imbalance in the "psychological nutrients," e.g., acceptance, affection, approval, attention, protection, control, and guidance. A complex matrix of behavioral disturbances which emotionally handicapped children exhibit, whether they are autistic, schizophrenic, or hyperkinetic, may include any or all of the following characteristics: short attention span, disordered behavior, emotional lability, social incompetence, defective work habits, impulsiveness, and specific learning disorders. A significant number of severe learning impairments associated with the hyperkinetic syndrome, also termed Minimal Brain Dysfunction (MBD), have been traced to nutritional imbalances and metabolic dysfuntion amenable to diet therapy. A prescription of megavitamins (Cott 1972), and complete elimination of foods containing additives (artificial colors and flavors) and foods rich in compounds containing salicylates (Feingold 1974) have produced significant results in correcting the MBD syndrome and improving academic achievement. In cases where the hyperactive child was also found to be hypoglycemic, a high protein, low starch, hypoglycemic diet eliminated the behavior problem (Powers 1974).

"Normal" and hyperkinetic children or neurotic children often exhibit similar behavior patterns. The distinction between them is in terms of the severity of the symptoms, such as aggression, excessive activity, withdrawal, fear, or stuttering. The use of tranquilizers, stimulant drugs, and other behavior modification drugs to change the biological state of the child, and consequently emotions and behavior, is at best only treatment of the symptoms and therefore very shortsighted when prescribed without a thorough and complete diagnosis. This treatment is only temporary in its ameliorative effects, and the children may later on withdraw to an inner world of their own or develop other problems related to drug use. Participating in later life in the normal activities of a socially responsible citizen, including parenthood, becomes difficult for drug abusers and eventually they may fill reform schools, mental institutions, and prisons.

Based on experiences working with so-called disadvantaged children and their families, many educators have taken the stand that environmental inadequacy is the primary factor contributing to intellectual deficiency, behavioral abnormalities, and the resultant inability of the child to cope with the increasing complexities of society. Such a stand is stark evidence of the growing gulf in the interdisciplinary

understanding between biomedical and behavioral sciences. Developmental deficits and behavioral abnormalities may have either genetic or environmental causes or a combination of both. It is important to note that such genetically determined causes of developmental lags or abnormalities are not correlated with race. Planners of intervention programs, in their efforts to facilitate optimum growth and development in children, cannot afford to overlook the importance of biomedical factors in releasing the child's potentialities.

Key Points of Intervention

The role of parents in facilitating the child's development has begun to assume a key position in intervention programs. There are many schools of thought as to the choice point of intervention in the self-perpetuating parent-child interacting cycle. Many feel that in early intervention programs it is advisable to work with parents during the first two years of life. Gordon (1968), Weikart (1969), and Nimnicht (1970) are among those who have advocated and implemented parent education and/or home visits as a part of early intervention programs. In the Anisa framework, the parents (particularly the mother-to-be), the fetus, the infant, and the preschool child assume central positions in the overall scheme of educational planning. The child is viewed as a part of an ecological system in which he or she is always experiencing some form of interaction with the evironment. Some interactions can be stimulating and supporting, thus providing the requisite conditions for optimal growth and development, while others can be suppresive of innate potential.

During the child's formative years the most significant and immediate change agent is the mother—a key element in the basic ecological system. Hence intervention is planned to include the mother as well as the unborn child. The role of the mother in the child's ecological system can hardly be overestimated. Her role may be the crucial variable in the operational definition of the term "disadvantaged" (Miller and Camp 1972). The mother's apathy, ignorance, and emotional immaturity, whether she be in Guatemala or Long Island, New York, is the ubiquitous contributing factor in the etiology of emotional aberrations, learning difficulties, and other handicaps in children.

Even though we have no true antenatal or postnatal norms, this should not be used as an excuse for indifference in providing adequate environmental conditions for the developing fetus and infant. The adequacy is largely determined by the mother's physical, psychological, and emotional status during the successive phases of motherhood. From our knowledge of intrauterine development and prenatal studies we can safely conclude that the environmental influences—biological, psychological, and cultural—begin to operate from the moment of conception (Montagu 1962). Of these influences, malnutrition is the most detrimental. The total environment of the newborn child is extremely restricted to practically one person —the infant's mother or her substitute. This limitation of the infant's habitat and of its social contacts permits one to have close control over the psychological factors that are also operative dur-

ing the early part of the child's life. The pivot of all development in this circumscribed environment is the quality of the mother-child relation during the early stages of growth. Therefore, this relationship becomes central to the ecological factor in the growth and development of the child. It is clear that proponents of preventive medicine and preventive psychiatry should invest a major portion of their resources in understanding the ecological factors that are in force during this period.

In summary, the Anisa model holds that human potentialities, whether biological or psychological, can be actualized only to the extent circumstances in the environment favor their phenotypic expression; and that the key strategy in any intervention program should be to insure sound nutritional, psychological, and emotional states of the mother at least a year prior to conception and during the pre- and postnatal growth of the child. According to the World Health Organization, "maternity care in the wider sense begins much earlier in measures to promote the health and well-being of the young people who are potential parents, and to help them to develop the right approach to family life and to the place of the family in the community (1969, p. 6). The statement goes on to add that objectives of such measures should be to insure "that every child wherever possible, lives and grows up in a family unit, with love and security in healthy surroundings, receives adequate nourishment, health supervision, and efficient medical attention and is taught the elements of healthy living" (1969, p. 6).

The ultimate dream of any intervention program should be prevention. The Anisa Model makes provision for intervening in the anticipated life of a child a year or so before conception by insuring that the nutritional status of each parent is adequate to maximize the likelihood of conceiving a fully-functioning, healthy child. Since the provision of adequate nutrition remains important throughout life, the model provides for collaborative efforts of community, school, and home to maintain an optimum nutritional status in all students and staff.

No major breakthrough in education can come about unless there is a high degree of integration and application of the vast body of research from several disciplines that have contributed to our understanding of human growth and development. Dubos observes,

> All systems of education and of research have been organized on an analytic pattern. What science has been successful at, by remaining for 350 years faithful to the Cartesian doctrine, is to take any kind of problem and dissociate it into its components. This is what universities are organized to do both in research and training. (Dubos 1967, p. 13)

Anisa is a mission-oriented project that has been precisely designed to make the kind of integration sorely needed for research and action and provides a blueprint for a system of education that will enable all individuals to actualize their full range of potentialities.

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