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MALNUTRITION, MENTAL DEVELOPMENT, AND THE USE OF EDUCATIONAL
TELEVISION: SOME SUGGESTED AREAS OF INQUIRY AND RESEARCH*

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Prepared for the "Primer Foro Latinoamericano de
Televisión para Niños", Mexico City, from the 24th
to the 28th of August, 1976.

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MALNUTRITION, MENTAL DEVELOPMENT, AND THE USE OF EDUCATIONAL TELEVISION: SOME SUGGESTED AREAS OF INQUIRY AND RESEARCH

Malnutrition affects a large percentage of the population of Latin America and is most prevalent in children. In Colombia the situation is similar to that of other countries of the region. Malnutrition is the cause of 45% of the deaths of children under five years of age (IDRC /1, p. C1) and fifty percent, or approximately two million Colombian children under five years of age suffer from light or moderate forms of malnutrition (Mora, Florez and Clement /9, pp. 52-53).

Infant malnutrition in particular is not only a health problem. It also has direct bearing on learning potential, education, and intelligence of the young, and eventually on the role they will play in the economy of the country. This point is illustrated by a Colombian physician with extensive experience in the field of nutrition:

Most countries assign a high priority to education and devote from 5 to 25 percent of their national budget to it. Nevertheless, their efforts to expand and upgrade their school systems are being in part defeated, because the children who survive severe malnutrition reach school age with diminished intellectual and learning ability. They are unable to take full advantage of the educational programs because we failed to protect their intellectual potentialities at the right time (Rueda-Williamson /11, p. 287).

Research in developing nations has shown how malnutrition in low-income groups exists as part of a general syndrome of multiple environmental deprivation, an important component of which is socio-cultural deprivation (ICBF /6, p. 1).

Manifestations of this syndrome include retardation in rates of intellectual development with effects on learning ability and intellectual competence in adult life.

It is becoming increasingly evident that the malnourished child is at a definite disadvantage by the time he enters the formal school system in terms of achieved and potential development of his mental capacities.

One aspect of the treatment of multiple environmental deprivation is nutritional supplementation. In addition, two recent studies have demonstrated the need to complement nutritional supplementation with environmental enrichment programs or "mental supplements". Findings from these studies contribute relevant data both for the analysis of existing educational television programs and for the formulation of future educational television programs for pre-school children and their parents.

The following first provides a brief summary of these studies and the significance of their findings for educational television and for nutrition programs. It then reviews the research findings of some nutrition programs and evaluations of educational television in the light of these findings. In way of conclusion, suggestions for various areas of inquiry related to the nature of educational television in developing countries with high rates of infant malnutrition are presented.

The author wishes to thank CEDEN (Centro para el Desarrollo de la Educación No-formal), a Colombian Institute soon to be carrying out a pioneer study in the field of mass programs of mental stimulation and nutrition for disadvantaged children, for their assistance in preparing these notes.

1.

Human Ecology Investigation Station, Cali, Colombia

In August 1970 the Human Ecology Investigation Station of the University of Valle Medical School commenced a study of 368 three-years-old children, 335 from low-income families and 33 from families of high income and educational levels, in order to determine how these could improve their physical, intellectual and social development as a result of daily nutritional and health care. The study examined the relationship between malnutrition and mental development, and the relationship between early education, and mental development and school performance. It was designed on the basis of three suppositions:

- (1) That the improvement of nutrition and health care in the pre-school years will result in increase in the ability to benefit from educational experiences.
- (2) That the stimulation of behaviour combined with the improvement in health in the pre-school years will produce an intellectual and social behaviour close to normal levels by the time the child reaches school age.
- (3) That the earlier the nutrition and health treatment is begun, the better and more durable the increase in ability to compete in life in the future will be (Estación de Investigaciones de Ecología Humana, Cali /4, p. 6).

The children were organized in eight experimental groups which received different treatments. All the groups received health care and nutritional supplements. However, some groups also received continual psychological-educational intervention in collective situations for different numbers of years during the period between 1970 and 1973. This integrated treatment was applied to three groups. It included intellectual demands, social interaction, physical demands, nutritional supplements, medical attention and training in hygiene.

Intellectual demands included: verbal production, elementary comprehension of quality and quantity, spacial and temporal relationships, manual and motor abilities, attention and concentration, and independent decision-making. Social interaction included competitive and cooperative activities and different social situations. Physical demands included cooperative games, competition, weight lifting and building situations.

The results of the experiment after the first few years have been summarized as follows:

- (1) Children who are born and brought up in marginal environments that lead to relatively lower physical development and high morbidity, at the age of three and a half are significantly below their potential levels of physical and social competence.
- (2) Nutritional supplements and health care initiated at age three and a half can produce more than normal increases in the growth of these children. This rhythm of growth varies according to the nature of the treatment and where it is administered. The earlier the treatment is begun the higher the maximum level of development achieved will be.
- (3) Although nutritional supplement and health care produce increases in physical growth, they do not produce, by themselves, increases in intellectual and social ability during the treatment.
- (4) On the whole, a program of nutritional supplement and health care combined with a program of educational and psychological stimulation can produce more than normal increases in cognitive and social development, at least during a year of integrated treatment. It also appears that the earlier the intervention in cognitive development commences, the level achieved is more satisfactory (Estación de Investigaciones de Ecología Humana /4, pp. 23-24).

In synthesis, what this innovative program has demonstrated up to the present, is that although nutritional supplement and health care administered to malnourished children at the age of three and a half can begin to compensate for their differences

in physical growth, they alone cannot compensate for their deficiencies in mental development, for which purpose, an added component of educational and psychological stimulation is required.

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The Colombian ICBF study focuses on the age period preceding that examined in the Cali project, providing in this way an opportunity to examine the effects of an earlier application of nutritional supplements and environmental stimulation. It is a "prospective longitudinal intervention experiment on children born to families at risk of malnutrition; the intervention begins at the sixth month of gestation and continues through the thirty-sixth month of child life" (ICBF /6, p. 3). The subject families were selected from low-income areas in which the mother was in the first or second trimester of pregnancy and at least half the children under the age of five in the family were malnourished by height and weight criteria. These families were assigned at random to six experimental groups, four of which are of interest here.

- A. Comprehensive health care only.
- A1. Health care plus psycho-educational stimulation for the target child from birth to 36 months of age.
- D. Health care plus supplemental feeding for the entire family (including the target child), from the sixth month of gestation to 36 months of age.
- D1. Health care plus supplemental feeding for the entire family, from the sixth month of gestation through 36 months of child age, and psycho-educational stimulation for the target child from birth to 36 months of age (ICBF /6, pp. 3,5).

The basic experimental design is a "two factorial design which makes it possible to investigate the relative effectiveness of the two interventions (nutrition and psycho-educational stimulation) alone, as well as the interactive effects of the combined intervention in preventing the intellectual retardation prevalent in multiple deprived children" (ICBF /6, p. 5).

Mental Stimulation Program

The Cali stimulation program was based on collective activities in day care centers. The ICBF program is structured on individual visits, two times a week to the homes of the target families during the period when the child is studied (birth to three years) by a specially trained, para-professional home visitor. The goals of these visits are:

- To stimulate the learning and development of the target child in all areas through direct action in his own environment by a trained para-professional home visitor; and
- To help modify, if necessary the interaction pattern between the child and his caretakers, in the home, so that stimulation --and hence learning and development-- can continue when the home visitor is not present (ICBF /6, p. 6).

Neither the caretaker nor the home visitor are professionals in early childhood education. Therefore, the "curriculum" of the stimulation program is simple, practical and explicit. This includes:

- Observation of the child's behaviour and environment and selection of appropriate activities for the child within this by the home visitor.

-- Interaction with the child by the home visitor in the context of the selected activities, feedback to new activities on the base of observation and interaction.

-- Stimulation by the home visitor of observation and interaction with the child and devising and implementation of new activities, by the caretaker, and the creation of situations for such interaction (ICBF /6, p. 10).

The caretaker-infant interaction appears to have three conceptually independent functions which are significant in influencing the development of the infant's cognitive motivation and functions: those which make the infant more available for the potential flow of information from his environment; those which focus the infant's interaction with his environment; and those which create in the infant the expectancy that his behaviour has consequences thereby establishing a motive to learn about, master and interact with his environment (ICBF /6, p. 18).

The results of the ICBF study have been reported as follows:

In summary, it appears that nutritional supplementation by itself produced a noticeable effect on physical growth in weight... Infant stimulation alone does not show apparent effects on physical growth... Finally, and interesting enough, there appears to be a great interaction effect of infant stimulation and supplementary feeding, the end result being a pattern of child growth similar to the standard growth curve. Further analysis will disclose the magnitude and mechanisms of such interaction effect. This finding is more important when considering the absence of a deliberately planned nutrition education component in the program /6, p. 43.

II.

Both of the studies described above observe significant interaction effects between infant stimulation and supplementary feeding. In the first case, the gain in mental development registered during the period of stimulation, brought the malnourished three-and-a-half year-old children closer to the level of development of normal children at this age. The end result of the combined mental and nutritional supplement in the ICBF study was a pattern of child growth similar to the standard growth curve, in other words, the treatment completely neutralized the effects of multiple environmental deprivation on the infants.

How do these findings relate to the nature and use of educational television and of mass nutritional programs understanding the former as mental supplement and the latter as physical supplement? First, in regard to mass programs of dietary supplementation they provide evidence that the simple distribution of nutritional supplements, at least at pre-school ages, is not enough to prevent the effects of environmental deprivation from taking their toll on the mental development of the young. Corroboration for this point is provided by a study conducted in Chile (Monckeberg and Schiefelbein /8) which attempted to determine if appropriate nutrition would eliminate deficiencies in school performance. A group of 60 children between 7 and 9 years of age, of low socio-economic levels and with growth retardation, were selected and given three complete meals a day at school. During the period, normal weight and height gains were registered, however, mental development experienced no significant variations. The authors observe that although the period of nutritional supplementation was relatively short, it can

be inferred from the study that adequate nutrition at school age will not affect the mental abilities of the individual. If this premises is accepted, the authors suggest, it can be pointed out that mental retardation is due to factors independent from nutrition (for example socio-cultural factors) or to the fact that at this age the damage is now irreparable (Monckeberg and Schiefelbein /8, p. 49).

A parallel can be drawn between the application of solely nutritional supplements, as is the case of many of the national nutritional programs in Latin America today, concerned essentially with the distribution of food stuffs, and the application solely of mental supplements as is the case today of educational television. Here the example used is Sesame Street, due to the extensive research which has been conducted on the effects of this innovative program.

In a recent article, various members of Children's Television Workshop, the creators of Sesame Street, stated that "school preparation was identified as the pervasive goal of the series", this included "Symbolic Process (which included the recognition of letters, numbers, and geometric forms and certain skills in the use of these symbols), Cognitive Organization (which included such skills as perceptual discrimination, understanding relationships among objects and events, classifying, sorting and ordering), Reasoning and Problem-Solving, and the Child and the Social and Physical Worlds" (Palmer, Chen and Lesser /10, p. 110). The authors continue to explain that the "series was designed for the benefit and enjoyment of all children three through five years of age, but with special emphasis given to the needs of children from urban, low-income backgrounds" (10, p. 110).

In effect, Sesame Street is directed towards the mental stimulation and education of the same age group as in the Cali experiment, keeping in mind that television is an individual and not a collective experience.

Sesame Street was later adapted for Latin American children, where among other changes, the Latin American advisors, "expanded the goal area of reasoning and problem-solving. They saw this goal as particularly useful for children in Latin America, partly because they felt that parents in Latin America do not sufficiently encourage active problem-solving activities in young children" (10, p. 110). In other words, what is needed in Latin America is more mental stimulation for the children.

Research have been conducted on the influence of this "mental supplement" alone on children. One such study was conducted by Gavriel Salomon, of Hebrew University in Jerusalem, who administered a group of tests to 317 five, seven and eight-year-old children prior to the onset of the broadcast of Sesame Street and again five months later (12, p. 141). Among other findings a clear interaction between initial mastery of skills and mastery improvements were noted. The author states:

Correlating initial mastery with the amount of later change (residual scores), we found that children who are initially more skillful benefitted most from format that called upon those skills. They showed no improvement where skills were supplanted. The opposite applied to the less skillful children: they did not benefit when existing skills were called upon, but they gained when skills were supplanted. This agrees with previous findings and strengthens the argument that media effects on cognition interact with the child's initial level of skill mastery.

He continues to ask:

Does the importing of media products like Sesame Street contribute to an "Equalization" of skill mastery? While one culture catches up with another's skills, the latter zooms ahead with its mastery of skill others. While the less able imitate a code and internalize it, those who have mastered it already will begin to master another skill. "Equalization" of skill mastery thus seems more apparent than real (Salomon /12, p. 143).

Similar findings of interaction between existing skill level and cognitive development with mental supplementation were found in a recent field study in Mexico (Diaz Guerrero et al. /2) with a sample of urban children and a sample of rural children drawn from economically deprived families in three small villages in the central valley of Mexico. During May and June 1974, pretest data were obtained in 1,113 cases of four and five-year-old children in the rural and urban settings. Two posttests were applied to the children after selective viewing of Sesame Street and other filmed material for children. Reviewing the findings the authors affirm:

The most striking outcome of the study is the ineffectiveness of Plaza Sesamo to improve significantly the cognitive development of rural pre-school children. Neither four nor five-year-olds, with or without purified control groups, showed any significant differences between viewing Plaza Sesamo or cartoons in either Phase I or Phase II of the experiment (Diaz Guerrero et al. /2, pp. 149-150).

A recent review of major critiques of Sesame Street also touches upon the point of the performance differential between more and less advantaged children. The author cites evidence provided by Cook et al., which compared the standardized mean and medium gain of advantaged and disadvantaged children and found that "it was actually the advantaged group which had shown the larger gains, significantly

larger in several of the comparisons (Liebert /7) . The same author mentions a dissertation in which it was "found that the first year of Sesame Street produced gains only for advantaged children" (Liebert /7).

The authors of the evaluation of Plaza Sesamo in Mexico suggest that perhaps one of the manners in which the "gap" can be closed between the learning performance of advantaged and disadvantaged children with educational programs such as Sesame Street is through the provision of "related forms of stimulation and reinforcement" especially in the form of interpersonal communication with the disadvantaged children (Diaz Guerrero et al. /2, p. 154).

In the light of the findings analyzed above from the two Colombian studies on nutrition and mental stimulation and the evaluation of the effects of Sesame Street and nutritional supplementation programs, the following section presents some additional suggestions for action programs as well as raising a few questions regarding educational television as it exists today in Latin America,

III.

Summarizing the findings, it has been observed that an interaction effect indeed appears to exist between mental stimulation, nutritional supplementation, and physical and mental development. This interaction is more marked the earlier the two supplements are initiated. On the other hand, partial programs of nutritional supplement or environmental supplementation alone have not been found to be effective for integrated individual development. A program of nutritional supplementation administered to malnourished children in Latin America will probably bring

these close to a normal level of physical development if begun at an early enough age. However, this alone will not remedy a situation of retardation of their mental and social development. Likewise, educational and mental stimulation programs such as Sesame Street have been shown to ultimately widen the gap between advantaged and disadvantaged children. It can be hypothesized, on the basis of the Colombian findings, that this is due in part to the physical conditions of the children as well as to the relatively disadvantaged nature of their earlier years in terms of mental stimulation.

If these findings are confirmed in further controlled experiments in Colombia and in other countries with conditions similar to those of Colombia (high percentages of malnourished children living in multiply deprived environments), a number of questions must be raised concerning the nature of educational television in these countries.

The first point which comes to mind is the need to integrate programs of mental stimulation, on an interpersonal or on a mass level such as those of educational television, with nutrition programs. What this means for national development programs and plans is that a national nutrition plan cannot be separated from the use of educational television and other forms of mass and interpersonal education. If children are to receive special care from a health perspective, they must also be given special attention from a mental perspective. Without this integrated approach, real performance cannot change.

A second related area is that of the use of educational television and other mass media alone, as means of mass education in developing countries with these characteristics. Obviously, without an integrated health and nutrition component these programs will only serve to widen the gap between advantaged and disadvantaged children. Although this might also be the case in developed countries, it becomes more acute in a situation where half the infant population suffers from some form of malnutrition.

Here a parallel can be drawn with the use of communication and mass media in developing countries to stimulate innovative behaviour in rural areas through the well-known innovation diffusion techniques. In this area research has also shown that it is not the fault of the peasant that he does not act more innovatively. In the same manner that it is not the fault of the malnourished child that he does not learn faster. This point was made by Milton Esman in regard to the peasant, in a recent meeting on Communication Strategies for Rural Development:

The reasons for the failure of small farmers to perform at technologically feasible (not to mention optimal) levels are surely complex. They include such factors as the lack of sufficient information on how to use improved techniques, hesitation to adopt changes because of risks and uncertainties, and commitments to values other than productive efficiency. While these explain some of the shortfall in farmers' performance, the operating premise of this paper is that structural constraints in the farmer's situation, that is, lack of realistic opportunity is the major explanation of this phenomenon /3, p. 71.

Among the structural constraints Esman mentions are: land tenancy unavailability or high cost of credit, and often exploitative marketing arrangements.

Similar observations on the inability of communication to alter structural situations of society, are pointed out by Felstehausen:

It is not communication which dictates the rules, values, resources, roles and other elements which characterize the level of development in society. 'Skilful communication can change a peasant's perception of this situation but it cannot, acting alone, change that situation very much' (Brown and Kearsal cited by Felstehausen 5, p. 43).

The caretaker-infant interaction functions noted in the Colombian ICBF study are essentially communication activities; those which make the infant more available for the potential flow of information from his environment; those which focus the infant's interaction with his environment, and those which create in the infant the expectancy that his behaviour has consequences thereby establishing a motive to learn about, master, and interact with his environment. Yet, in the same way that the farmer is not going to change his activities solely because of information, the child, as has been demonstrated in the studies above, will not achieve a higher level of mental development with communication alone.

What suggestions can be formulated on the basis of these observations for the use of educational television in developing countries? The first is the need to translate that which up to the present has been conducted solely on an interpersonal level with extremely high costs, in workable mass programs of infant mental stimulation. In order for this to occur, the following and probably other steps must be taken:

-- Systematization of the existing knowledge about the types, effectiveness and application of different infant mental stimulation methods.

-- Translation of this knowledge into action programs utilizing different interpersonal and mass media and, in particular television and radio.

-- Evaluation and verification of these "translations". For example, what types of stimulation can be transmitted directly through a mass medium and which must be mediated by a caretaker.

-- The study of what type of information on the administration of stimulation can be transmitted to the caretaker and family unit through mass media and what information must be given directly using interpersonal methods. Here educational television assumes a principal role given the ability to demonstrate visually different techniques of infant stimulation. Part of the solution may be to direct educational television to caretakers rather than to children.

-- Motivation will form an important part of this experiment. The Colombian studies involved family units which were motivated to participate in the study by free health care and nutritional supplements. The question that comes to mind is if programs of this sort, which must necessarily be oriented towards the infant-caretaker dyad, can function without any motivational element other than the purported mental development of the child.

Apart from action research, further controlled research is also needed to determine more exactly the age periods when the stimulation must occur and the length of this.

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The above notes attempt to confront new knowledge about environmental stimulation and mental development with present programs both of nutritional supplementation and environmental stimulation through interpersonal education and communication activities. Some future roles of education television in this field have been suggested and a number of questions raised concerning the effectiveness of educational television in developing countries.

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