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NUTRITIONAL UNDERSTANDING OF PRESCHOOL CHILDREN TAUGHT  
IN THE HOME AND CHILD DEVELOPMENT LABORATORY

by

Thomas R. Lee

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Family and Human Development

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah

1979

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Thomas R. Lee

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## ABSTRACT

Nutritional Understanding of Preschool Children Taught  
in the Home and Child Development Laboratory

by

Thomas R. Lee, Master of Science

Utah State University, 1979

Major Professor: Dr. Jay D. Schvaneveldt  
Department: Family and Human Development

This study was devised to determine the readiness of preschool children to learn about basic concepts of nutrition. Sixty preschool children enrolled in the Utah State University Child Development Laboratory, comprised the sample. Twenty children were taught at home by parents, 20 were taught at the Laboratory, and 20 received no instruction. The curriculum was based on the concept of nutrient density and used the Index of Nutritional Quality (INQ) in developing instructional materials. INQ is an index for comparing the amount of nutrients to the amount of calories in a food. Food Profile Cards, visual representations of this information for non-reading preschoolers, were the main teaching tools.

Findings indicate that preschoolers are capable of learning about nutrition using the INQ concept. Mean comparisons of pre and posttest scores on a 12-item nutrition test were significant in the classroom and home-taught groups. Children in either treatment condition



improved at significant levels in ability to recognize foods, identify nutrients in foods, and identify nutrient functions in the body.

(76 pages)

## INTRODUCTION

In the United States of America, it is assumed that most everyone enjoys adequate nutrition. However, this is not the case among a significant part of the population, even where income is not a hindrance (Wyse, Sorenson, Wittwer, & Hansen, 1976). In spite of overconsumption of calories, nutrient deficiencies may commonly exist in an individual. In general, food selection is not done on the basis of a nutritionally valid rationale (Emmons & Hayes, 1973), but on the basis of beliefs gained through advertising, family traditions, or other reasons.

The effects of poor nutrition on development of young children are among the most potentially dangerous (Raman, 1975; Twardosz, Cotaldo, & Risley, 1975). Although it is hard to document specific effects, poor nutrition precludes optimal mental and behavioral development. It is generally recognized that attitudes and practices acquired in the early years of life will be influential throughout the lifespan. Thus, the early years would be the ideal time to begin to build sound nutrition practices and habits.

Traditionally, children have had little or no responsibility for determining the nutrition they receive, as parents or caretakers have been responsible for the child's nutrition. Often, children resist parent's attempts at insuring that they receive a nutritionally balanced diet.

In order to investigate the process of educating young children about nutrition, a program was developed for use in the home and the Child Development Laboratory at Utah State University. Basic concepts of nutrition were adapted to appropriate levels for preschool children. Using age-appropriate Nutrient Density profile cards, children were taught to identify foods strong in particular nutrients and what these nutrients mean to the child's development. The Index of Nutritional Quality developed by Hansen (1973) provided the conceptual basis for the curriculum.

Given the national need to initiate nutritional education programs, especially for young children, it was calculated that careful, systematic research would be the most useful approach to take. It is within this national need for better nutrition education and our understanding of the cognitive-emotional development of children that this research was launched.

#### The Problem

There has been a great deal of interest in the nutritional needs of young children; child nutrition has even become a global concern (Olsen, 1976). The thrust of these research and education programs has been to determine the nutrition requirements of young children and to inform parents and government agencies of these needs. These efforts have been external to the child. Programs seeking to educate young children about nutrition have been limited to food preparation, how foods grow, tasting foods, etc. These programs have not dealt with teaching concepts of nutrient functions and sources.

In general, the available nutrition education has taken place in the school setting. While recent studies have shown that preschool education in general can improve later success in school, it has not been determined whether preschool education is most effective in the home setting or the classroom (Bell, 1973; Moore, 1978). Further, we do not know enough about the maturational readiness of preschool children to respond to nutritional curriculums.

#### The Purpose

This study was devised to determine to what extent preschool children are developmentally ready to gain understanding of nutrition through an appropriate nutrition curriculum program. In addition, the study also sought to determine the effectiveness of nutrition education in the home as opposed to a Child Development Lab.

#### Hypotheses

The following hypotheses were investigated:

1. There is no difference in scores on the nutrition test of children in the study before and after the nutrition curriculum.
2. There is no difference in knowledge of nutrition in children who received home-based instruction, classroom instruction, or no instruction at all as measured by the nutrition test.
3. Among children who received home-based instruction, there is no difference in scores on the nutrition test as a result of time spent in teaching by the parents, or other family characteristics.

## REVIEW OF LITERATURE

### The Need for Nutrition Education

The importance of nutrition in the normal development of young children is widely recognized. Poor nutrition can diminish mental development (Levitsky, 1976; Selowsky, 1976) and affect the development of behavior and personality (Raman, 1975).

According to Raman (1975), nutrition is the key factor in the realization of the child's biological potential. Nutrition's importance prenatally and during the first year of life has long been recognized. However, poor nutrition can also inhibit the development of the child during the preschool years in critical ways. This occurs both by limiting biological growth and by reducing the energy and inquisitiveness so necessary to exploration and stimulating contact with the surrounding world (Letitsky, 1976).

Concern with the nutrition of the young has become a global concern (Olson, 1976; Hersh, 1978). In the United States, many government programs have dealt with studying these nutritional needs and regulating public and private institutions to see that nutritional needs are met. Programs such as WIC (Supplemental Food Program for Women, Infants, and Children) are evidence of governmental concern with the importance of sound nutrition (Ade, 1978).

The reason for the general interest in nutrition is not because of a lack of foods in the United States, but because of a failure by many people to eat the right kinds of foods.

Leading nutritionists concur that the basic problem of nutrition in all countries of the world where there is a reasonable standard of living is one of education. (Geddes, 1964, p. 120)

Nutrition problems occur not because of quality of food available, but because of poor eating habits.

Most nutrition education up to the present has been aimed at the teenage or adult audience. And yet Martin (1954), reporting on Robert's nutrition work with children, states that it is in early childhood that children develop their taste for the foods to which they are accustomed, whether these foods are nutritionally good or poor. Norman (1977) notes that despite the fact that nutrition education is an established discipline, the eating habits of the general public have changed little as a result of nutrition education in recent years.

It is often assumed that people can change their food habits. Lambert and Schwab (1975) tested this assumption by comparing the eating habits of individuals who pledged to change eating habits and those who did not. They found little carry-over of improved eating habits (i.e., eating better foods or eliminating poor food choices) even among those who signed a pledge to change. They found responsiveness to be greatest among children in the primary grades. From this finding they concluded that nutrition education should be introduced at the primary grade level.

Some research suggests that many habits and attitudes have largely been established by the time of entrance into the primary grades.

Many researchers in child development have concluded that preferences, attitudes, and practices have been formed by the age of five years. Those espousing this theory state that the early years are the most critical and that the socialization occurring then influences the rest of life.

Considering all the developmental influences that humans experience, those that occur during the early years of life have the most profound effect. (Raman, 1975, p. 27)

Moore, in a report of a national study on the persistence of pre-school effects, contends that structured preschool experiences, whether in the home or nursery school, have positive benefits that carry over into the school years. Wyman (1972) found that by the teenage years, a majority of people have poor diets and eating practices. Nutrition education programs at this point often meet resistance however. Teenagers choose their foods because of peer pressure, because of convenience, or to make themselves happy during a period of turmoil or unrest. Food may even become the symbol of rebellion for some teenagers (Wyman, 1972; Norman, 1977). Thus, many factors make the teen years a difficult time to each nutrition.

Another persuasive argument for nutrition education for young children is advanced by Hansen (1973). Increasingly, he states, only the evening meal is eaten at home in the family group. Each individual is becoming more responsible for their own diet and ought to understand and practice good nutrition.

In summary, the need for nutrition education with young children is important for several reasons. Sound nutrition is important for

young children to insure their maximum mental, physical and behavioral development. There is also evidence that early childhood is a critical period in developing habits and attitudes about food, and that later in life attempts to change food habits through education meet with little success. The early years, even before entrance into the schools, seems to be the ideal time for teaching children sound attitudes and practices about nutrition.

#### Nutrition Education Programs for Preschoolers

There is increasing importance attributed to nutrition education and food experiences for young children. In this review of literature, however, programs teaching a conceptual understanding of nutrition were completely absent. Nutrition education dealt with awareness of foods, tasting, preparing, or seeing foods produced and marketed.

The emphasis upon food awareness rather than conceptual understanding of nutrients and their functions, stems from the belief that preschool children are too young to learn about nutrition. Martin (1954) in discussing Robert's nutrition work with children states:

Subject matter in the sense of "nutrition facts" has no place at the primary grade level. Emphasis should be on the creation of favorable attitudes toward food and the formation of good food habits. (p. 420)

The philosophy regarding nutrition education for young children seems to follow that set forth by Martin in the above cited work. Speaking of developing good food habits in children she states:

There is no better way to accomplish this than to provide them [children] with well-prepared, good-tasting meals which meet those needs. By so doing, children are subjected to a subtle but effective and lasting type of nutrition education. (Martin, 1954, p. 292)



The preschool has a responsibility to teach young children about good nutrition according to Smith (1978), national president of the Association for the Education of Young Children. The way this responsibility has been fulfilled however, seems to be along the lines suggested by Martin (1954).

The articles reviewed were limited to food awareness experiences like those suggested by Martin. Karsch (1977), Kositsky (1977), and Galen (1977) all report on programs designed to meet the nutrition education role of the preschool. These follow the traditional pattern of food experiences designed to teach something else (i.e., language, quantitative, science). They are limited to the growing, preparing or tasting of foods. There is no reference in the literature to teaching nutrition in terms of nutrients, nutrient functions in the body, and foods that are good sources of specific nutrients. One program (Madsen, Madsen & Thompson, 1974) sought to increase consumption of nutritional foods by offering sugary rewards--a technique condemned by Norman (1977) as developing preferences for sugary foods.

The traditional methods of presenting nutrition facts have made it difficult for preschools to do more than provide experiences with food. Nutrition was taught in terms of food groups, getting so many servings from each food group, and was somewhat vague and intangible.

The concept of nutrient density is a relatively new way of looking at the nutritional quality of foods. Using this concept, Hansen (1973) developed a way of evaluating the nutrients found in foods that greatly simplifies the task of understanding fundamental concepts of nutrition. The Index of Nutritional Quality (INQ) developed by Hansen, is a simple,

consistent index which graphically shows the nutritional quality of any food. Using this index, a food's nutritional quality is computed by dividing the food's nutrients by the calories in that amount of the particular food. The equation for the Index of Nutritional Quality may be represented thus:

$$\text{INQ} = \frac{\text{Percentage of nutrient requirement}}{\text{Percentage of energy (calorie) requirement}}$$

In other words, the percentage of an individual's daily requirements for a given nutrient which a food provides is divided by the percentage of the individual's daily energy (calorie) requirement which the food provides.

The Index of Nutritional Quality has been commented on by several researchers in the literature (Wyse, et al., 1976; Wittwer, Sorenson, Wyse, & Hansen, 1977; Sorenson & Hansen, 1975). According to these authors, INQ is useful because it provides a precise way of talking about foods, rather than using vague descriptive terms like "good" or "poor." Because of the quantitative nature of this index, the nutritional quality of foods can be shown in graph form. As the percentage of nutrient in a food increases, the bar on the graph gets longer. This bar can be compared against the bars of other nutrients or the calories. Thus, INQ presents nutrition information in a way that is basic enough for preschoolers to interpret.

#### Readiness of Preschoolers to Learn about Nutrition

Learning about nutrition would seem to involve cognitive skills and processes that are too advanced for preschool age children to master.

3) were thought to be the purpose of the present study to understand the idea of perceptual skills. The children also had verbal skills. There is evidence that these skills, as

young children are able to evaluate the present situation such as think and act. Studies have shown concepts such as pretend, forget, and remember. Research has confirmed that such mental verbs, which are apparently not developed

until the age of three, are used to recognize pictures were used in a study with aged, three, four, and five year olds. Short and long term memory for items seen more than once showed retention at a rate of 80% around that seeing an item enhanced memory even when the item was not seen. (Campione (1972) and Campione (1972) found that children's ability to

discriminate. The results of this 1972 study showed that children remembered the idiosyncratic differences of similar pictures and not just basic outlines of an image. Berry, Judah, and Duncan (1974) attained similar results in picture recognition tests. One discrepant finding was an age/sex interaction in their results until the three year old males were separated out. They concluded that the three year old males were not developmentally ready to successfully perform the task of picture recognition.

In a study of memory behavior by Wellman, Ritter, and Howell (1975) they found that deliberate memory behavior was engaged in by three and four year old children. In particular, when children were instructed to remember something, they engaged in deliberate strategies to help themselves remember. They did not use such strategies to help themselves remember when not specifically instructed to try to remember.

There is also extensive research into the developmental stages at which children acquire quantitative concepts. In one interesting study (Kramer, 1978) children from four to six years of age were tested to determine at what age 80% of the children in that age group showed mastery of a particular quantitative concept. Many of these concepts are acquired at five or six years of age. One of the few concepts acquired by age three-and-a-half, was the concept of longer than. Shorter than was acquired much later. This is of interest to the present study in that the concept of longer than was critical to interpreting the Food Profile Cards.

This brief review of the developmental skills that were important to the present research indicates that the concept of knowing, the concept of longer than, and memory and perceptual skills are sufficiently developed in preschool children to work with the Food Profile Cards.

#### Teaching Nutrition in the Home

If nutrition is to be taught during early childhood, it must take place either in the home or preschool environment. Some feel that preschool education takes place more effectively in the home.

The home environment contains many factors that ought to enhance learning. Prescott (1978) states that day-care should be structured like a good home. Cahoon, Price, and Scoresby (1973) contend that families are a major force determining whether or not children learn successfully. This is because a child learns best when there is a warm, close relationship between the child and the teacher. Cahoon, et al. contend that the quality teaching experience depends on this relationship between child and teacher, and that this relationship ought to be characterized by trust, warmth, and openness. They further assert that the home, with the parent/child relationship that already exists there, provides this quality learning environment. In the public classroom, there is not the same opportunity for close, personal relationships as found in the home.

In a study on the effects of increased teacher supportiveness on preschool children's learning, Larsen (1975) had mixed findings. Children, especially girls, learned a motor skill better with increased support. On cognitive tasks, however, both males and females learned

better in an unvaried support condition. This is in contrast to the view held by Cahoon, et al. (1973) referred to above.

Bell (1973), in his monograph on home-based learning for preschool children, states that love and warmth are essential to effective learning. He also states that the home is more influential than the school in the young child's learning process. There are benefits for parents, as well as their children, who pursue a program of home-based preschool education. Bell states that "the result (of home-based teaching) should produce a priceless gift for the child and a great sense of accomplishment for the parent" (Bell, 1973, p. 13). This benefit was also noted by Hersh (1978). In supporting his case for preschool education in the home, Bell continues:

The opportunity to take full advantage of early childhood intellectual development comes only once in each child's lifetime. Most of it comes before the child enters school. (Bell, 1973, p. 15)

There need not be a great investment in time or special equipment to realize these benefits of home-based education according to Bell. Parents can educate their children as they go about their normal activities and with ordinary household items.

Smith (1978) states that for most American families the motivation to provide well for their children's education is present. The capability to teach is often lacking. Many parents feel inadequate as teachers.

Parent as teachers. The concept of parents as teachers has an ancient tradition dating back to the Old Testament. In modern times educators have made parents feel that they are to maintain a hands-off

attitude with regard to their children's education. It has been a generally held belief, however, that what parents do in the early developmental years of their children is important. Gordon (1972) cites several researchers that have found that what parents do as teachers during their children's early years is important for their later learning. Gordon concludes that many parents are doing well as teachers, just by following their instincts. He contends that parent education is a reasonable thing, and that more parents need to teach their children in a deliberate and conscientious manner.

Food habits are formed in the home. The impact the family has on eating habits and food preferences is well known (Kolasa, Wenger, Paolucci, & Bobbit, 1979; Raman, 1975). In a study done with persons having special dietary requirements (Becker, Maimon, Kirscht, Haefner, & Drachman, 1977) it was found that for children, the attitudes of their parents are the primary determinants of the dietary habits of the children. Mothers in the home seem to have a unique advantage over the school in developing sound attitudes and habits about nutrition.

Smith (1978) contends that the purposes of the preschool include providing nutrition education and involving parents in the education of their children. The home provides the natural atmosphere where both these objectives can be met. Kolasa et al. (1979) noted that families attempt to learn many things in the home, often without consciously recognizing that fact. With input from professional nutritionists in formal and informal ways, families could function better in their role as nutrition educators for their children. Families may be the key point for nutrition intervention (Raman, 1975).

### Summary

It is becoming increasingly recognized that nutrition is important to the physical, mental, and behavioral development of young children. Traditionally, good nutrition has been something the young child has acquired from the habits of his/her parents or caregivers. It has not been something for which the child is responsible.

Recently, the development of the Index of Nutritional Quality (Hansen, 1973) has made it possible to present basic nutrition information in simple terms. The importance of the early years of childhood to lifelong food habits and attitudes, make the preschool period an ideal time to begin teaching nutrition with a concept such as INQ.

Several studies indicate that preschoolers have the developmental skills to learn about nutrition using the INQ concept. Memory, recognition, and quantitative understanding are sufficiently developed to work with basic nutrition concepts using the food profile graphs based on INQ.

In general, teaching preschoolers nutrition concepts is assumed to take place in the schoolroom where trained teachers can foster good food practices and attitudes. The home has also been discussed by several as having a unique opportunity to teach. It has not yet been resolved as to which environment is most effective.



## PROCEDURE

### Research Design

The design for the research involved establishing objectives appropriate for the preschool age children, the development of curriculum materials, the assignment of subjects to treatment groups, the orientation and instruction of parents and teachers, the development of instruments to evaluate the program, and analysis of the results.

The research design was a simple before and after model, with two types of treatment groups and one control group. A pretest and post-test were administered and results analyzed to determine which treatment condition was the most effective.

Nutrient density. The basic concept used in the nutrition curriculum was that of nutrient density--i.e., the ratio of nutrients to calories in a portion of a particular food. The Index of Nutritional Quality developed by Quarth Hansen (1973), of Utah State University and discussed by several researchers (Wyse, et al., 1976; Wittwer, et al., 1977; Sorenson & Hansen, 1975) was the index used in developing the curriculum materials. The Index of Nutritional Quality can be represented as:

$$INQ = \frac{\text{Percent of nutrient requirement}}{\text{Percent of energy (KCa) requirement}}$$

This index makes it possible to graphically represent the nutrient density of any food such that young children could understand and see the relationship between energy and nutrients.

Concepts and objectives. The basic concepts used in developing the curriculum for the preschoolers were the same as those established by Brown (1977), and Brown, Wyse, and Hansen (1979) for Kindergarten and first grade children. These basic concepts are: (a) Understanding that nutrition begins with recognition of and interest in a variety of foods. (b) The food profile card indicates a food's nutritional value. (c) Grouping nutritionally balanced foods is an important first step in understanding the concept of a balanced meal. (d) There is a definite relationship between the nutritional content of the foods we eat and our health.

The objective of the program was for the children to demonstrate understanding and competence in reading the Food Profile Cards on a posttest.

Curriculum manuals. A manual of lesson plans had been developed by the Department of Family and Human Development for use in the Child Development Laboratory in 1977-78. This was tested in the Child Development Laboratory during 1977-78 and proved to be most useful. This curriculum program was used again in 1978-79 with implemented changes suggested by the research team. A second manual was developed for use in the home. It contained the revision of lessons with activities adapted for use in the home by parents or other family members (see Appendix C).

Food profile cards. The main teaching tools for the preschool children were the Food Profile Cards (see Appendix C). Each card displayed a color photograph of a portion of food and the name of the food in large type. In graph form the percentages of Vitamin A, Vitamin C,

Iron, and Calcium were displayed in color coded bars. Using the cards did not require the ability to read. To facilitate recognition of nutrients by the pre-reading children, an artist's drawing of the nutrient's function to the side of each bar was also provided. For example, a drawing of bones and teeth indicated calcium. On the back of each card, more detailed computer printout information was provided for the benefit of teachers. In the home-taught group, it was too costly to provide this printout information on cards so this information was included in the back of the parent manual.

Songs and skit. Part of the lesson plans for both classroom and home-taught groups was the use of songs to teach and review nutrient names and functions as well as sources of such. A skit developed to review the four nutrients taught, their sources, and their functions was used only in the classroom.

Subjects. The sample consisted of 60 preschool age children from the Utah State University Child Development Laboratory. The children ranged in age from three-and-one-half years old to five years old. They were evenly divided in terms of sex, with 29 males and 31 females.

Children in the USU Lab School were enrolled by their parents. Parents put the child's name on a waiting list and paid a \$30 registration fee when the child was enrolled. This rather nominal fee puts the preschool experience within the reach of parents in almost any socio-economic level. The sample was predominantly from white, middle-class homes. Many parents were employees of the University.

Each quarter, the children are assigned to a classroom of 20 children where it is the goal to have equal numbers of males and females.

This process is based on a waiting list, and is handled by an administrative secretary.

Classroom-taught group. The group where the investigator served as Head Teacher was selected as the group to receive instruction at school. This group received all instruction at school and none at home.

Home-taught group. The group selected for instruction at home, was the class which meets in the morning at the same time as the investigator's class. This was done so that the investigator could more easily coordinate distribution of materials, etc., to the parents of the children in this group.

Control group. This group of 20 children received no instruction or treatment. They were, of course, given a pre and posttest.

#### Teacher and Parent Training

Teacher orientation. Each academic quarter, a new group of student teachers register for the student teacher training experience in the Child Development Laboratory. Teachers are assigned to each classroom and supervising teacher by the Child Development coordinator. This is done according to the student's schedule constraints and in hopes of putting together a strong team of teachers in each classroom.

After the student teachers had been assigned to the group where the investigator worked as supervising teacher, the student teachers were introduced to the nutrition education program. Each teacher was given a complete packet of lesson materials for the nutrition education project. The project in which they would be involved and discussed and

the benefits of their involvement were reviewed. The Food Profile Cards were introduced and discussed. The experimenter found these student teachers to be enthusiastic and positive about the project.

Parent orientation and instruction. A letter was sent out three weeks prior to the beginning of the Winter Quarter, 1979, informing parents of the group that was to be taught at home, and of their involvement in the project (see Appendix A). They were informed of a meeting that was to be held a few days before the beginning of the Lab program to explain their role in the project. A very stormy winter night resulted in only about 50% attendance, but those unable to attend were given necessary instruction on an individual basis in the next few days.

Parents were introduced to the concept of INQ and how this made possible the development of the Food Profile Cards. The Food Profile Cards, the parent manuals, and any questions of scheduling were discussed. Although parents were at first skeptical about the effectiveness of the program, once they saw how the Food Profile Cards could be used, they were enthusiastic about the possibility of teaching basic nutrition concepts to their children.

### The Instruction

Scheduling. Both the group taught at home and the classroom-taught group were taught over an eight-week period. This is the period that the children are normally enrolled in the Lab School. The lesson materials for each group followed the same sequence and it was planned that the curriculum for each group be correlated to assure comparability.

During the course of the quarter, letters were sent to the parents of the home-taught group (see Appendix A). These were to remind them of where they were to be in the curriculum, and encourage them to pursue the remaining lessons in sequence. Letters were also sent in connection with the questionnaires. The eight-week period was divided as follows: (a) Preparation week; (b) Vitamin C week; (c) Calcium week; (d) Iron week; (e) Vitamin A week; (f) Vitamin A week (continued) and review week; (g) Review; (h) Dinner week. It will be noted that Vitamin A week was actually one-and-one-half weeks. Past experience had shown us that children had a harder time grasping Vitamin A and its function. Also, it is necessary to note these weeks are only four days. At the USU Child Development Laboratory each Friday is for evaluation and preparation with the student teachers; no children attend the lab on Friday.

Classroom instruction. In the classroom, the nutrition curriculum occupied only 15-30 minutes each day. These nutrition learning activities were worked into the regularly planned lesson activities that the student teachers had prepared. All materials for the nutrition activities were paid for out of the research grant from the Gerber Products Company.

The instruction involved activities with the whole group or in groups of four or five children and a teacher. The concepts were taught using discussion, songs and skits, a puppet called Eric Energy, visitors (nurst, dairy science professor), and with many experiences preparing, serving and eating foods. All of these activities were invaluablely augmented with the use of the Food Profile Cards. The teachers

in the lab rated the INQ cards as being especially important in the educational objectives.

Home instruction. Parents at home were given the same lesson materials, the same activities adapted for home use, and the Food Profile Cards. Because of reproduction cost, there were not enough sets of cards for each family to have its own. Therefore, the cards were rotated between families. The families were divided into five groups of four families each. Every half week, the families rotated the cards so that each family received them for three or four days every other week. This rotation of the cards took place when parents dropped off and picked up their children at the Child Development Laboratory. At their request, parents were given a reminder telephone call the day before they were to return the cards.

#### Evaluation of the Program

Pretest and posttest. All three groups, the classroom, the home and the control were given a pretest during the first week of preschool, and a posttest during the last three days of the quarter. The instrument was a 12-item test, three items for each of the four nutrients. This instrument is reproduced in Appendix B.

Questionnaires. The home taught group was also evaluated with the use of questionnaires. Three of the four times parents received the Food Profile Cards, they were asked to complete and return a questionnaire with the cards. They also completed a somewhat longer questionnaire at the conclusion of the study (see Appendix B).

Scope of the study. The study was designed to assess the feasibility of teaching preschool-age children about nutrition in the home as the preschool. The findings must be viewed in light of the fact that the sample was a select one of middle-class, highly-educated people. The homes used are not necessarily representative of all homes where nutrition might be taught to young children. Further, the Child Development Laboratory, while similar to a good preschool, is a specialized setting for training teachers and conducting research in child development. These qualifying conditions must be kept in mind in generalizing about the findings of this study.

Analysis of the data. The statistical analysis of the data was done with one way and two way analysis of variance. The T-Test was also used to compare pre and posttest means. Parent comments and other background information are depicted with appropriate descriptive statistics. Results were computed on the Burroughs computer at the USU Computer Center.



## FINDINGS

The importance of nutrition to the development of young children has led nutrition professionals and lay persons to devote an increasing amount of attention to this area. The majority of such research and education efforts has been directed to parents and caretakers rather than the children themselves. Those programs developed for young children have not sought to teach nutrition concepts, but have stressed experiences with food.

The present study sought to determine the readiness of children to learn about nutrition concepts. Children were taught in the Child Development Laboratory at Utah State University, or at home by parents. Results of the two teaching techniques were compared.

This section deals with the finding of the study. A general descriptive discussion of the sample is presented. The three main hypotheses are each reported on in turn. Other findings of the study are then reported.

### Description of the Sample

The sample consisted of 60 preschool age children enrolled at the Utah State University Child Development Lab. The children's ages ranged from 45 months to 65 months, with 80% of the children between four and five years-of-age. The mean age for the sample was 54.8 months, or about four and a half years of age. The sample was divided

evenly between males and females, with 29 males and 31 females. Table 1 provides a demographic profile of the children in the study.

Table 1  
Descriptive Profile of Children in the Sample

Group	n	Age (months)		Sex		Birth order	
		Range	X	M	F	Range	Mode
Classroom	20	45-64	55.3	9	11	1-5	3
Home	20	47-62	52.6	10	10	1-5	3
Control	20	47-65	56.6	10	10	1-6	2

The parents and families of the children in the study were very comparable in terms of race, social class, and education. The sample was predominantly white, middle-class, and highly educated.

Families in the sample ranged in size from one to eight children. The mean number of children per family was 3.5 with three and four children being the number of children in 55% of the families. The children involved in the study were predominantly in the firstborn, secondborn, or thirdborn. Thirdborn was the most frequently occurring birth order position for children in the study. Thirty-three percent were thirdborn, 21% were firstborn, and 18% were secondborn. The remaining 18% were born later than third in their family. The results of analyzing the educational and occupational levels of parents in the study also reveals a very consistent pattern. Fathers in the sample families were equally split in educational attainment, 33% having

completed only some college and 33% having completed graduate school. This is reflected in the fact that 37% of the fathers were employed in professional careers, while 32% were employed craftsmen/technician occupations. The occupational categories of the fathers were determined according to Blau and Duncan (1967). The percentages for each subgroup in the sample matched closely these aggregate totals, again indicating homogeneity (see Table 2).

The majority of mothers in the sample were full-time homemakers; 68% fell into that category. In spite of the fact that 43% had completed some college and 35% had obtained the four-year degree, only 9% were employed in full-time occupations such as clerical (6%), or professional (1 case). Thirteen cases, or 22%, were employed on a part-time basis in various areas--many with work done in the home. There was one student couple who had a firstborn child in the study. The other 59 parents were all graduated and involved in their occupational pursuits.

In summary, the sample consisted of 60 preschool children with a mean age of four-and-a-half years. Their parents were white, middle-class, and highly educated with 87% of the fathers having completed some college or more, and 88% of mothers having completed some college or more. The fathers were primarily the wage-earners with the majority of the mothers being full-time housewives. All but two of the 60 families were intact, two-parent families.

Table 2  
Descriptive Profile of Parents of Children in the Sample

	Classroom	Home	Control	Frequency	Totals
n	20	20	20	60	100(%)
n of 2-parent families	19	20	19	58	--
Education of mother					
High School	2	3	1	6	10 %
Some College	11	8	7	26	43 %
College	5	6	10	21	35 %
Graduate Study	1	3	2	6	10 %
Education of father					
High School	2	-	2	4	6 %
Some College	8	8	4	20	33 %
College	5	4	5	13	21 %
Graduate Study	4	8	8	20	33 %
Occupation of mother					
Homemaker	14	13	14	41	68 %
Part-time	2	7	4	13	22 %
Full-time	4	-	3	6	10 %
Occupation of father					
Professional	5	9	8	21	37 %
Craftsman	8	8	3	19	32 %
Manager	3	1	1	6	10 %
Proprietor	1	1	5	7	12 %
Other	3	1	3	7	11 %
n of children					
1-2	4	3	8	15	25 %
3-4	11	14	8	33	55 %
5-6	5	2	4	11	16 %
7-8	--	1	--	1	3 %

### Hypothesis 1

The first hypothesis states that there is no difference in the scores of children on the nutrition pretest and posttest as a result of the nutrition education program.

The total pretest scores were compared with the total posttest scores for all 60 children in the sample as a whole. The T-Test was used to compare the means of the pretest scores with the posttest scores. A maximum score of 12 was possible on the test. Four items dealt with food recognition, four with nutrient identification, and four with identifying nutrient functions. The null hypothesis was rejected at the  $p = .0001$  level of confidence (see Table 3).

Table 3

Comparison of Pretest and Posttest Scores for the Combined Sample

n	Pretest $\bar{X}$	Posttest $\bar{X}$	Dif.	t	p
60	1.68 $\pm$ .8	4.7 $\pm$ 3.0	3.03	-7.95	.0001

The findings show that the effects of the nutrition education program were significant for the sample as a whole. The next hypothesis deals with the findings by the treatment group.

### Hypothesis 2

The second hypothesis states that the test scores of the children in the sample will not differ significantly by group: classroom-taught;

home-taught; or control. In assessing this hypothesis, analysis of variance was used to compare pretest scores within each group.

Table 4 shows the difference in pretest and posttest scores within each group. The Table shows that the T-Test statistic reveals a difference in pretest and posttest scores significant at the .001 level in the groups receiving instruction and also a significant difference in the control group at the .004 level. The fact that the control group also obtained a significant T-value was surprising until the three content areas of the nutrition test were separated. These areas were again; food recognition, nutrient identification, and nutrient function identification.

When the test scores were classified according to three categories of responses it was shown that the control group had improved significantly in the ability to merely recognize foods from pictures. The two treatment groups had also improved significantly in food recognition. There was no significant difference between the three groups on the food recognition item, as improvement was about equal in all three groups.

When test scores for the items on identifying nutrients in foods and describing what the nutrients do for the body, there was no significant difference in pre and posttest scores for the control group. The scores of the children in the two treatment groups showed an increase in understanding significant at levels from  $p = .05$  to  $p = .0001$ .

Comparing between the groups, the classroom-taught group learned significantly better than either the home-taught or control groups.

Table 4

Number of Correct Responses on Pretest and Posttest According to Type of Instruction

Group	n	Pretest		Posttest				Dif	p
		$\bar{X}$	S.D.	Range	$\bar{X}$	Mode	Med.	$\bar{X}$	
Classroom	20	1.6	.68	3-12	7.4	8	8	5.8	.0001
Food Recognition		1.5	.60		2.7			1.1	.0001
Nutrient Ident.		.05	.28		2.5			2.4	.0001
Function Ident.		0.0	.00		2.3			2.3	.0001
Home	20	1.9	.68	1-10	4.4	1&3	3	2.5	.0001
Food Recognition		1.7	.85		2.4			.6	.02
Nutrient Ident.		0.0	.00		1.05			1.05	.004
Function Ident.		0.1	.30		.95			.85	.007
Control	20	1.6	.68	1-5	2.35	2	2	.75	.004
Food Recognition		1.6	.68		2.1			.5	.02
Nutrient Ident.		0.0	.00		.1			.1	.16
Function Ident.		0.0	.00		.15			.15	.08

Note: Maximum score for each complete test = 12.  
 Maximum score for each sub-category of test items = 4.

The home-taught group did not show a statistically significant improvement over the control group, although there was a strong tendency towards significance. The p values for the home group were, of course, larger than those for the control group, indicating that the home-taught instruction was effective.

### Hypothesis 3

The third hypothesis states that there is no difference in test scores among children in the home-taught group as a result of the amount of time spent in teaching the nutrition curriculum by the parents or other family characteristics. In this case, the results were not sufficient to reject the null hypothesis.

The amount of time spent teaching by parents was computed using responses parents provided on three questionnaires during the course of the study, and on a questionnaire at the completion of the study. The other family characteristics (i.e., number of children, parents education and occupations, sibling involvement, parent interest, child interest) were also collected with the questionnaires. One way analysis of variance was used to test the relationship between time spent with the nutrition program and the child's test score. Although there was a trend towards amount of time spent being related to the child's test score, it was not significant on any of the four reportings of time spent.

Figure 1 represents the amount of time spent as reported on the cumulative final questionnaire. For this report, the T-value had a p of .5.



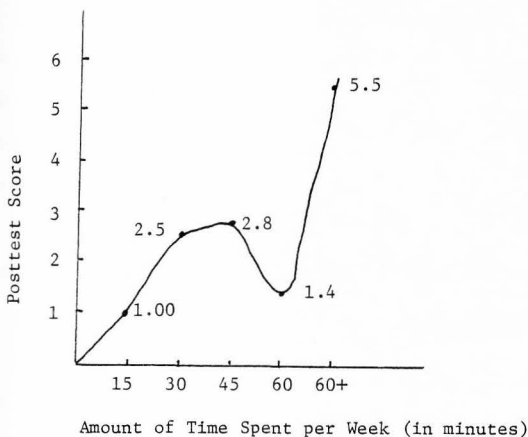


Figure 1. The effect of time spent per week by parents on nutrition curriculum and test scores of children in the home group.

#### Other Findings of the Study

Numerous other independent variables were tested to evaluate their relationship to nutrition knowledge as reflected by test scores. One way analysis of variance was used to test these variables within each group. Few of the demographic variables noted in the description of the sample showed a significant  $f$  within the different groups. There were some tendencies in the findings however.

Demographic variables. Age of the child was not significantly related to test score in the classroom group, although it was positively related in the home group at a  $p = .02$  level. Sex of the subject was not significant in any of the treatment or control groups.

The number of children in the subjects family of orientation was also tested for significant relationship to the child's test scores. No significant relationship was found to exist between family size and nutrition test score. Birth order position was not significant in either of the treatment groups.

In general, the educational or occupational backgrounds of the parents did not have a significant effect. A significant  $f$  value was obtained for the classroom group on the one way analysis of education of father and child's nutrition understanding,  $p = .04$ . The occupation of the father was not related to learning in either treatment group. The mother's occupation did not seem to be related. In other words, whether the mother was employed or not didn't seem to make a difference. In the home group, the number of hours the mother worked out of the home--if any--was also reported. This did not have any effect in the home group sample where mothers did the teaching at home. The variable, education of the mothers, for children in the treatment groups, tended towards significance. This tendency was stronger in the classroom group ( $p = .13$ ) than it was in the home group ( $p = .23$ ). In general, then, children's learning did not differ significantly in the two treatment groups according to demographic variables.

Further analysis of the home group. Because of the wide variability in teaching styles and environments from one home to another, further analyses were performed on the home group in an attempt to isolate significant factors. In general, there was no consistent pattern of findings.

The parents of children in the home group reported on items having to do with parent's interest in the project, child's interest, and whether or not other siblings were involved. Parents also reported on what effect having or not having the Food Profile Cards had on learning, the number of suggested learning activities were done. These variables will be discussed here.

As already reported, the amount of time parents spent on the nutrition project each week, was not significantly related to the child's learning. It was assumed that parent's interest or child's interest in the study would affect the quality of time spent, but these variables were not significant in explaining differing test scores of the home-group children either.

All of the parents reported that the mother had done the teaching. This finding is supported by Schwaneveldt (1976) who reported that mothers had the greatest impact on nutrition awareness and eating habits in the home. Other parents reported that siblings were also involved in the learning activities. No significant relation was found between sibling involvement and the subject's learning however.

The majority of the parents commented on the effectiveness of the curriculum, and in particular the Food Profile Cards. Many stated that more time was needed with the Food Profile Cards and that they were

handicapped in teaching by having to share the cards with other families. However, on the discrete questionnaire items about the Food Profile Cards, no significant relationship was shown between having them or not, and how well the child learned. Neither number of lesson activities done, nor the inclusion of other self-planned learning activities were significant.

It is important to note that 19 out of 20 parents in the home group felt that this program of home-based nutrition instruction ought to be more widely available to parents. The Food Profile Cards were seen as an exciting, effective teaching tool. Several parents reported on improved eating habits of their children in the study. For instance, more children were more willing to eat highly nutritious foods, such as broccoli, now that they could see what it did for the body. No report was obtained from parents of children in the classroom group to compare any changes in eating habits between the two treatment groups. However, parents of children in the classroom group were also very enthusiastic about their children's involvement with nutrition education and informally reported benefits of increased responsiveness to and interest in nutrition by their children.

## SUMMARY AND DISCUSSION

### Summary

The intent of this study was to determine to what extent preschool children are ready to learn about nutrition. The study's purpose also included investigating the effectiveness of nutrition education for preschoolers in the home, as compared to nutrition education in the Child Development Laboratory.

A sample of 60 preschool children enrolled in the Utah State University Child Development Laboratory was used for the study. This sample consisted of 29 males and 31 females from 45 to 65 months. Eighty percent of the sample was between four and five years of age. The mean age was 54.8 months, or four and a half years old.

These 60 children came from predominantly white, middle-class, intact families. Their family patterns were traditional with 68% of the wives being full-time homemakers. The parents were highly educated with 87% of the fathers and 88% of the mothers having had some college education. Fathers were employed mainly as professionals or craftsmen/technicians.

The 60 children in the sample were in three groups of 20 each. One group was taught in the Child Development Lab, one group was taught exclusively at home, and one group served as the control. A pretest and posttest were administered to assess any change in nutrition understanding as a result of the program. This test consisted of interviewing each child individually and asking them 12 questions.

These questions dealt with recognizing pictures of foods, identifying the nutrients in the foods, and describing the nutrient functions.

The visual materials used in the pre and posttesting were the Food Profile Cards. These teaching tools used in the curriculum were developed on the basis of the nutrient density concept. In particular, they utilized the Index of Nutritional Quality (Hansen, 1973; Sorenson & Hansen, 1975; Wittwer et al., 1977; Wyse et al., 1976). Eight weeks of lesson plans with activities, songs, and field trips were used in the home and classroom. The use of the Food Profile Cards was an integral part of all the lessons and learning activities and reinforced the concepts being taught in the lessons.

Although the Cards were used in the home as they were in the school, limited funds made it impossible to provide a set for each family and necessitated sharing the cards. Thus, children at home had access to the cards every other week for three to four days at a time.

In addition to the pre and posttests, children at home were evaluated with four waves of questionnaires. Three questionnaires were sent out during the course of the eight-week program. The fourth questionnaire was administered at the conclusion of the study.

#### Summary of Results

Three main hypotheses were investigated in the study. These dealt with the pre and posttest scores of the sample as a whole, the effect of receiving the nutrition instruction under different treatment conditions, and the effect of time commitment by parents on children's learning at home.

1. There was a significant difference in pre and posttest scores of the sample as a whole. Taking all 60 children collectively there was an increase in nutrition understanding significant at the .0001 level, using the T-Test to compare pre and posttest means.

2. When the results were analyzed by treatment group, it was found that the classroom-taught and home-taught groups had significantly increased in ability to recognize foods, identify nutrients studied (vitamin A, vitamin C, calcium, and iron). The control group had increased significantly in ability to recognize foods but had made no change in identifying nutrients and their functions.

Comparing across groups, it was found that the three groups differed significantly from each other. The classroom group had learned significantly better than the home group and control group. The home group test scores, while not differing from the control group at a level of significance, had a strong tendency in that direction. Within the home group, the difference between pretest and posttest scores was significant.

3. There was no significant relationship in the home group, between amount of time spent on the nutrition curriculum and learning. Eighty-five percent of the parents spent between 30 minutes and one hour on the nutrition education curriculum per week. A trend towards more time spent being positively related with better learning was noted, however. In an attempt to control for variation between different home environments, several variables dealing with family characteristics were tested with no significant results.

### Discussion

The first and most obvious conclusion to be drawn from the findings is that preschool age children are capable of learning about nutrition with a nutrient density based curriculum. Such a conclusion must be qualified with the fact that the Food Profile Cards are necessary to such instruction. The children were trained to respond to questions with the Food Profile Cards, and for the most part did not gain a conceptual understanding independent of having the Food Profile Cards to stimulate recognition and remembering. Of course, the goal of the study was for the children to be able to interpret the Cards, and respond to nutrition questions using the Cards. Some of the children gained sufficient understanding of the nutrition concepts that they were able to respond to questions about nutrition without the stimulus of the Cards present.

Why were some children able to do better than others in the nutrition program? Within the two treatment groups there was a standard deviation of about 3 points on a 12-item scale. This indicated a large variability among children within each treatment condition. The standard deviation within the control group was less than one point, indicating that what change there was between pre and posttest scores was quite universal and consistent within the control group. This supports the conclusion that the change in mean score for the control group was limited to ability to recognize pictures of food. This is largely a maturational effect, enhanced by experiences with listening, visual discrimination, and language development that all the children received in



their Child Development Lab experience. In other words, it is possible that all children's test scores would have increased significantly on the food recognition items without any nutrition curriculum, simply because of the maturation enhancing activities in the Laboratory.

In the present study, none of the background variables were sufficient discriminators of variation in individual children's learning in the home or classroom. Although intuition indicated possible reasons, statistical tests were not able to support any of the variables of age, sex, or family background. This is due in part to the very small sample size within each group. The number of children falling into each category within a variable was so small that an extreme score could change the mean of the whole category.

The effectiveness of teaching nutrition in the Child Development Lab classroom is well-established, especially in view of the fact that a program conducted in 1977-78 achieved similar results as the present study (Merrill, 1978). Within the classroom group, some children got all 12 items right while others made no significant change from the pre-test. While it is very hard to test young children with great reliability, and some children may have simply been disinterested in answering questions when they were posttested, it was concluded that maturational differences independent of age accounted for variation in the test scores within the classroom.

The variability in learning within the home group was also possibly related to maturation, as age proved to be an important variable. However, due to the fact that children in the home group were taught in

very different environments all coming under the heading "home," many other extraneous factors could enter in. Although it seemed logical that those children whose parents spent more time with the nutrition lessons would learn better, this was not supported by the findings. Again, small sample size affected this. On the time variable particularly, there was too much variance within each category. For instance, one child in the "one-hour per week" category with a low score could pull down the mean for the other children and mask any significant effects for time. It is also important to note that inasmuch as 80% of the parents spent between 30 minutes and 1 hour per week with no significant differences in learning. This would lead one to assume that parents can teach their children something worthwhile regarding nutrition without a great deal of time and energy.

Parents in the home group sample undoubtedly varied considerably in the quality of teaching done. One hour of nutrition education in one home was probably not equivalent to one hour in any other home in the sample. Many parents expressed a need for more instruction and orientation in their teaching role.

In the present study, it was concluded that children are capable of learning about nutrition with a nutrient density based curriculum. The Food Profile Cards were seen as particularly valuable tools by parents and teachers involved with the study. Although in the present study, children learned better in the classroom than at home, it was further concluded that children can learn as well at home, if parents are trained better and Food Profile Cards are available to each family on a full-time basis.

### Recommendations for Further Research

Although the findings of this study are very promising, there remain more questions to be answered. Additional research on the following questions would be useful:

1. The effectiveness of nutrition in the home and preschool could be investigated further with a larger sample and a more diverse cross-section of economic and cultural backgrounds.

2. The effect of the INQ based nutrition curriculum in the attitudes and food preferences of young children would be worthwhile to study. A pretest and posttest could include not only items tapping cognitive understanding, but behavioral impact of the nutrition education as well.

3. Many factors could be investigated more completely in a study focused entirely on home-based preschool nutrition education. Such a study could have implications for home-based preschool education generally. Things to consider in designing such a study would be:

- a. Providing Food Profile Cards for each family involved;
- b. Providing more instruction and supervision for parents in their teaching role;
- c. Refining materials so parents could be more self-directed;
- d. Utilizing other resources to disseminate information and coordinate teaching efforts such as educational television.

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Appendix A

**APPENDICES**

Communications with Parents



Appendix A  
Communications with Parents

we're  
 12/13/78 to  
 every lab. Chris

DEPARTMENT OF  
 FAMILY AND  
 HUMAN DEVELOPMENT  
 UMC 29

December 12, 1978

Dear Parents:

According to our records, your child will be in the USU Child Development Laboratory for the Winter Quarter beginning January 8. We anticipate that you and your child are looking forward to this special experience. We commend you for making the plans necessary to enroll your child, and wish to assure you of our commitment to the growth and development of young children as well.

The Child Development Lab experience is available because of our need to train student teachers and conduct research. This quarter, as part of a research project, we have developed a curriculum for parents to use at home to teach their children some basic concepts about nutrition. The classroom to which your child has been assigned, has been selected to use these materials at home. Another classroom will receive the nutrition education at school and the effectiveness of the two approaches will be compared.

As a parent, you have the greater opportunity to foster the kind of learning and development that researchers have found to be so crucial during the early years of life. The materials we have prepared will give you specific activities to teach your young child about nutrition. In the process, we feel your relationship with your child will be strengthened. Also, we think you will gain a sense of satisfaction from having done something to educate and benefit your child.

In order to give you the home-learning materials and explain their use, a meeting is scheduled for Thursday, January 4, from 7:30-8:30 p.m. It is important that you be in attendance, so that you and your child will receive maximum benefit from the parent manual and materials we have prepared. Thank you very much.

Sincerely,

Thomas R. Lee, Supervising Teacher

Barbara LaPray, Director, CD Lab

## UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

COLLEGE OF FAMILY LIFE

DEPARTMENT OF  
FAMILY AND  
HUMAN DEVELOPMENT  
UMC 29

January 31, 1979

Dear Parents,

Several of you have asked about the schedule you should be following in using the nutrition program with your children. We have found it best to teach only one nutrient at a time and to follow the sequence of weeks as the lessons are presented in the parent book. The following is a tentative schedule:

January 8-14	Preparation week
January 15-21	Vitamin C week
January 22-28	Calcium week
January 29-February 4	Iron week
February 5-14 (10 days)	Vitamin A week
February 15-25 (11 days)	Interim and Review week
February 26-March 5	Dinner week

I hope this schedule can be followed as closely as possible. I appreciate all the cooperation I've received from each one of you.

Sincerely,

Tom Lee

ms

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DEPARTMENT OF  
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UMC 29

USU Child Development Lab  
February 20, 1979

Dear Parents:

We are now approaching the end of the term for the children in the Child Development Lab, and the end of our present phase of the Nutrition Education Project funded by the Gerber Food Foundation. We are excited and encouraged by the reports we have received from parents concerning their experiences teaching nutrition to their children. The cooperation from you all has made it most enjoyable conducting this research. We feel that the understanding we gain will be most valuable to us in recommending ways that young children can learn nutrition most effectively.

We have enclosed a corrected copy of the Ham Quiche recipe from the parent manual that you received at the beginning of the project. It is to be used during the Dinner Week, which will be the week of February 26 to March 1. We will be giving the post-test to the children on March 5 and 6, the last days of the term. We hope that they can have completed the curriculum by that time.

Thanks again for your help and cooperation in this study. We hope that it has been a rewarding experience for everyone involved.

Sincerely,

Thomas R. Lee  
Supervising Teacher

ms

Enclosure

USU Child Development Lab

March 1, 1979

Dear Parents:

As near as I can tell, I haven't received back one of the three short questionnaires sent to you in connection with the nutrition study. To help us make our data more complete, please take a few moments to complete the enclosed form. Fill it out in terms of this past week's activities from February 26 through March 4. Please return it to preschool with your child on Monday.

Thank you for your cooperation.

Sincerely,

Thomas R. Lee  
Supervising Teacher

DEPARTMENT OF  
FAMILY AND  
HUMAN DEVELOPMENT  
UMC 29

March 9, 1979

Dear Parents,

The Winter Quarter at the USU Child Development Lab has ended, and with it the present phase of the Gerber Nutrition Project. To help us assess the usefulness of our program, we need to have your evaluation. In order to do that, please take a few minutes to complete the enclosed questionnaire.

All your responses will be kept strictly confidential. We are interested in the overall trend, rather than singling anyone out. Please give us your honest opinions.

Thank you for your time and help. We will send each of you a brief summary of the results of the study as soon as they are compiled. Your completed questionnaire should be returned within a two day period after receiving it. A self-addressed stamped envelope is included for your convenience.

Sincerely,

Thomas R. Lee

Supervising Teacher

Appendix B

Appendix B

- 1. Tell us what food this is.
- 2. Tell us what nutrients it contains that is good for us.
- 3. Tell us what vitamin does for our bodies.

Appendix B

- 1. Tell us what food this is.
- 2. Tell us what nutrients it contains that is good for us.
- 3. Tell us what protein does for our bodies.

Appendix B

- 1. Tell us what food this is.
- 2. Tell us what nutrients it contains that is good for us.
- 3. Tell us what vitamin does for our bodies.

Appendix B

Instruments

Appendix B

- 1. Tell us what fruit is.
- 2. Tell us what nutrients it contains that is good for us.
- 3. Tell us what iron does for our bodies.

Appendix B

- 1. Tell us what fruit is.
- 2. Tell us what nutrients it contains that is good for us.

## GERBER TEST

## Grapefruit

1. Tell me what food this is. (Provide answer if child doesn't know)
2. Tell me what nutrient it contains that is good for us.
3. Tell me what Vitamin C does for our bodies. (cuts and/or gums)

## Milk

1. Tell me what food this is.
2. Tell me what nutrient it contains that is good for us.
3. Tell me what Calcium does for our bodies. (bones and/or teeth)

## Spinach

1. Tell me what food this is.
2. Tell me what nutrient it contains that is good for us.
3. Tell me what Vitamin A does for our bodies. (eyes and/or skin)

## Liver

1. Tell me what <sup>food</sup> this is.
2. Tell me what nutrient it contains that is good for us.
3. Tell me what Iron does for our bodies. (blood)

CODE

Score 1 for a correct response.

Mark 2 for an incorrect response.



## Gerber Nutrition Project

## Follow-up Questionnaire

1. Child's name \_\_\_\_\_
2. Age in months \_\_\_\_\_
3. Number of children in the family \_\_\_\_\_
4. Birth order position of the child 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (circle one)
5. Parents' occupations: Father \_\_\_\_\_  
Mother \_\_\_\_\_
6. If the mother is employed outside the home, how much time is involved per week? 10 hours\_\_\_\_, 20 hours\_\_\_\_, 30 hours\_\_\_\_, 40 hours\_\_\_\_
7. Indicate the educational level of the parents:  

Father: Some High School _____	Mother: Some High School _____
High School Grad _____	High School Grad _____
Some College _____	Some College _____
4-yrs College _____	4-yrs College _____
Graduate Study _____	Graduate Study _____
8. In general, how interested were you in nutrition before the project?  
Very interested\_\_\_ Interested\_\_\_ Not too interested\_\_\_ Completely uninterested\_\_\_
9. In general, how interested in nutrition are you now that the project is complete?  
Very interested\_\_\_ Interested\_\_\_ Not too interested\_\_\_ Completely uninterested\_\_\_
10. Has this experience added to your knowledge about nutrition?  
Very much\_\_\_ A little\_\_\_ Not very much\_\_\_ Not at all\_\_\_
11. Has this experience altered the way you plan your meals?  
Very much\_\_\_ Somewhat\_\_\_ Not very much\_\_\_ Not at all\_\_\_
12. How interested do you feel your child was in this project to begin with?  
Very interested\_\_\_ Interested\_\_\_ Not too interested\_\_\_ Completely uninterested\_\_\_
13. How interested do you feel your child is in his or her own nutrition now?  
Very interested\_\_\_ Interested\_\_\_ Not too interested\_\_\_ Completely uninterested\_\_\_
14. Did your child enjoy learning about nutrition?  
Very much\_\_\_ Somewhat\_\_\_ Not much\_\_\_ Didn't enjoy at all\_\_\_
15. How often did the child ask to do the learning activities?  
Always\_\_\_ Often\_\_\_ Sometimes\_\_\_ Never\_\_\_

6. On the average how much time did you spend with your child on the nutrition education project per week? 15 min\_\_\_, 15-30 min\_\_\_, 30-45 min\_\_\_, 45-60 min\_\_\_, 60 minutes plus\_\_\_, other\_\_\_
7. What time of day was the teaching usually done?  
Morning\_\_\_ Afternoon\_\_\_ Evening\_\_\_
8. What part of the week was the teaching usually done?  
Weekdays\_\_\_ Weekend\_\_\_
9. Who did most of the teaching? Father\_\_\_ Mother\_\_\_ Older sibling\_\_\_
10. Was as much time spent on the project when you didn't have the food profile cards? Yes\_\_\_ Almost\_\_\_ Not quite\_\_\_ Definately not as much\_\_\_
11. Was your child able to learn the concepts as well without the food profile cards? Yes\_\_\_ Almost\_\_\_ Not quite\_\_\_ Definately not as well\_\_\_
12. Do you think this program ought to be more widely available to parents?  
Yes\_\_\_ No\_\_\_

Comments:

- What did you like about the program?

- What didn't you like about the program?

- What recommendations do you have?

- Other

Thank you

Thank You for your cooperation

Child's name \_\_\_\_\_ Date \_\_\_\_\_

### Nutrition Study Parent Questionnaire

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning							
Afternoon							
Evening							

1. On the chart above, indicate the time of day (morning, afternoon, or evening) and the approximate amount of time spent on the nutrition education project each day with your preschool child.
  
2. Who has done the primary teaching in connection with the project?  
 Mother \_\_\_\_\_ Father \_\_\_\_\_ Both \_\_\_\_\_
  
3. Have other children or family members been involved? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Who has been involved? Brother \_\_\_\_\_ Sister \_\_\_\_\_ Other \_\_\_\_\_  
 In what ways have they been involved? \_\_\_\_\_  
 \_\_\_\_\_
  
4. How many of the suggested activities have you used from the manual with this week's concept? \_\_\_\_\_
  
5. What activities were particularly effective? \_\_\_\_\_  
 \_\_\_\_\_ Why were they effective? \_\_\_\_\_  
 \_\_\_\_\_
  
6. What activities were not effective? \_\_\_\_\_  
 What made them ineffective? \_\_\_\_\_
  
7. How do the Food Profile Cards affect the success with which you are able to get the nutrition concepts across? \_\_\_\_\_  
 \_\_\_\_\_
  
8. Have you used other activities that you have found to be effective?  
 Yes \_\_\_\_\_ No \_\_\_\_\_ If so, what were they? \_\_\_\_\_  
 \_\_\_\_\_
  
9. Comments:

Thank you

Profile of Activities Used at Home for Iron Age

1. Teach your child what iron does for the body and what rich healthy foods. This can be done by teaching the "Iron Song" and by talking about the pictures on the activity cards.

"Iron Song"

(Tune: "Little Peter Rabbit")

Iron is so good for you, so eat it every day.

Iron is so good for you, so eat it every day.

Iron is so good for you, so eat it every day.

So your blood will be healthy and strong.

2. Help your child to be able to identify iron-rich food.
3. Work with your child on the food profile cards. Help him to be able to identify foods that are a good source of iron by identifying foods that have red lines longer than the black areas or they provide more iron than calories. Also help him to identify foods that are a poor source of iron by identifying foods that have a red line shorter than the black area or they provide more calories than iron.

Appendix C

4. Prepare liver in a Instructional Materials and the family will eat it. Have your child help in the preparation. Talk to your child about the nutrients it contains. Some possible recipes:
  - a. Cut liver into 1/2" strips. Broil slices of liver with french dressing. Broil three inches from heat for three minutes; turn, top with onion slices, broil three to four minutes longer.
  - b. Cut liver into strips. Broil liver that has been marinated in soy sauce overnight.
  - c. Cut liver into strips. Broil unmarinated liver with mushrooms.
  - d. Cut liver into strips. Dip the liver in flour seasoned with salt and pepper. Broil.
5. Watch for a time during the week when your child has an opportunity to see some blood such as a cut, scratch, or nosebleed. If the occasion arises, then discuss with your child the nutrients we eat to have rich, healthy blood.

Example of Activities Used at Home for Iron Week

1. Teach your child what iron does for his body--helps build rich healthy blood. This can be done by teaching the "Iron Song" and by talking about the picture on the profile cards.

"Iron Song"

(Tune: "Little Peter Rabbit")

Iron is so good for you so eat it ev'ry day  
 Iron is so good for you so eat it ev'ry day  
 Iron is so good for you so eat it ev'ry day  
 So your blood will be healthy and strong.

2. Help your child to be able to identify the color red.
3. Work with your child on the food profile cards. Help him to be able to identify foods that are a good source of iron by identifying foods that have red lines longer than the black areas or they provide more iron than calories. Also help him to identify foods that are a poor source of iron by identifying foods that have a red line shorter than the black area or they provide more calories than iron.
4. Prepare liver in a way that you, your child, and the family will eat it. Have your child help in the preparation. Talk to your child about the nutrient it contains. Some possible recipes:
  - a. Cut liver into 1/2" strips. Brush slices of liver with French dressing. Broil three inches from heat for three minutes; turn, top with bacon slices, broil three to four minutes longer.
  - b. Cut liver into strips. Broil liver that has been marinated in soy sauce overnight.
  - c. Cut liver into strips. Broil unmarinated liver with mushrooms.
  - d. Cut liver into strips. Dip the liver in flour seasoned with salt and pepper. Broil.
5. Watch for a time during the week when your child has an opportunity to see some blood such as a cut, scratch, or nosebleed. If the occasion arises, then discuss with your child the nutrient we eat to have rich, healthy blood.

6. Prepare another iron food like dried fruit with the help of your child. Apricot leather is easy and can be made from bottled fruit. Place fruit in a blender and mix until a thick puree is made. Pour puree onto a saran wrapped cookie sheet. Place in oven for 6-8 hours at 150°. Have your child taste the fruit leather and talk to him about the nutrient found in dried fruit.
7. At this point your child will have learned that dried apricots are a good source of iron and that they are also a good source of vitamin A. Again you might point out to your child that a food can be a good source of more than one nutrient.

#### Materials:

Apricots  
 Juice  
 Sugar  
 Paper plates  
 Paper cups  
 Paper napkins  
 Paper towels  
 Paper plates  
 Paper cups  
 Paper napkins  
 Paper towels  
 Paper plates  
 Paper cups  
 Paper napkins  
 Paper towels

#### Activity:

In a small group activity, the children will identify, cut up, and juice several different fruits: apples, bananas, lemons, grapes, etc., and oranges. After the juice is made, sugar will be added, if desired, and the juice then put in coffee cans to be frozen as popsicles for the following day. All the seeds and skins should be saved for a collage later in the week. When partially frozen, lemon, grapefruit sticks (or slices) can be cut and cover with plastic wrap.

The children will then come together for a whole group activity where the nutrient character, Eric Energy, will come and visit. We'll introduce the children to the nutrient vitamin C and tell where we get vitamin C and what vitamin C does for our bodies. A pattern for the puppet Eric Energy is taped at the end of this vitamin C lesson.

#### Summary:

Eric Energy will give each child a picture of a citrus fruit and have him tell what nutrients it contains in the fruit and what it does for our bodies. The fruit will be sent to students the children for the rest of their next activity.

#### Evaluation:

Example of Activity Done in the Classroom

## Monday - Vitamin C Week

Behavioral Objectives:

1. The children will be able to name two foods that contain vitamin C.
2. The children will be able to name two things that vitamin C does for their bodies -- promotes healing and builds strong healthy gums.

Materials Needed:

Tangerines  
Limes  
Lemons  
Grapefruit  
Oranges  
Cutting knives  
Cutting boards  
Juicers  
Muffin tins  
Sugar  
Eric Energy puppet  
Popsicle sticks

Activity:

As a small group activity, the children will identify, cut up, and juice several different citrus fruits: tangerines, limes, lemons, grapefruits, and oranges. After the juice is made, sugar will be added, to taste, and the juice then put in muffin tins to be frozen as popsicles for the following day. (All the seeds and skins should be saved for a collage later in the week). When partially frozen, insert popsicle stick (or similar stick) and cover with plastic wrap.

The children will then come together for a whole group rug activity where the INQ nutrient character, Eric Energy, will come and visit. He'll introduce the children to the nutrient vitamin C and tell where we get vitamin C and what vitamin C does for our bodies. (A pattern for the puppet Eric Energy is found at the end of this vitamin C unit).

Summary:

Eric Energy will give each child a picture of a citrus fruit and have him tell what nutrient is contained in the fruit and what it does for our bodies. The fruit will be used to dismiss the children from the rug to their next activity.

Evaluation:

Vitamin C Song: (Tune: If You're Happy and You Know It)

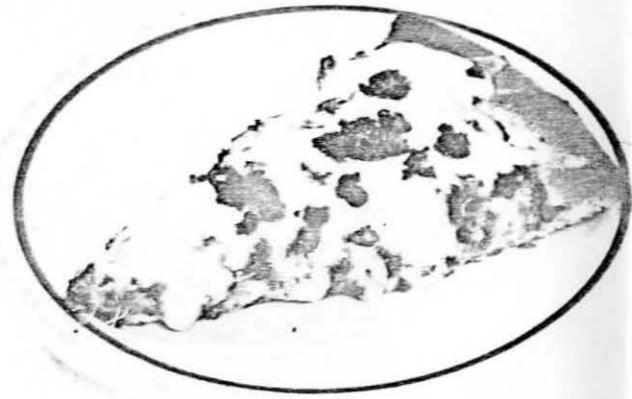
If you want good healthy gums, what do you eat?  
If you want good healthy gums, what do you eat?  
If you want good healthy gums, if you want good healthy gums, if you  
want good healthy gums, what do you eat? Vitamin C.

If you want your cuts to heal, what do you eat?  
If you want your cuts to heal, what do you eat?  
If you want your cuts to heal, if you want your cuts to heal, if you  
want your cuts to heal, what do you eat? Vitamin C.







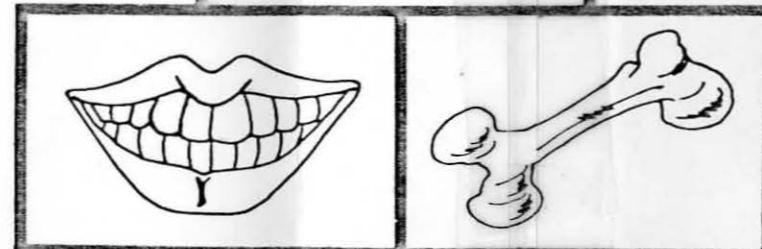


Pizza

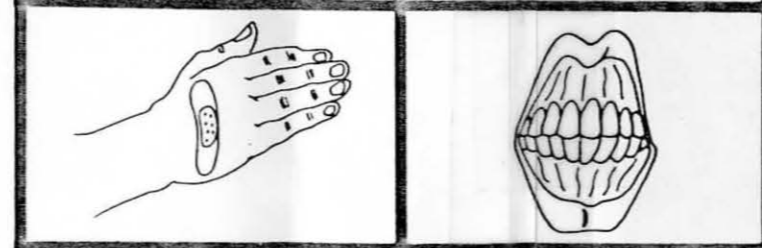
Vitamin A



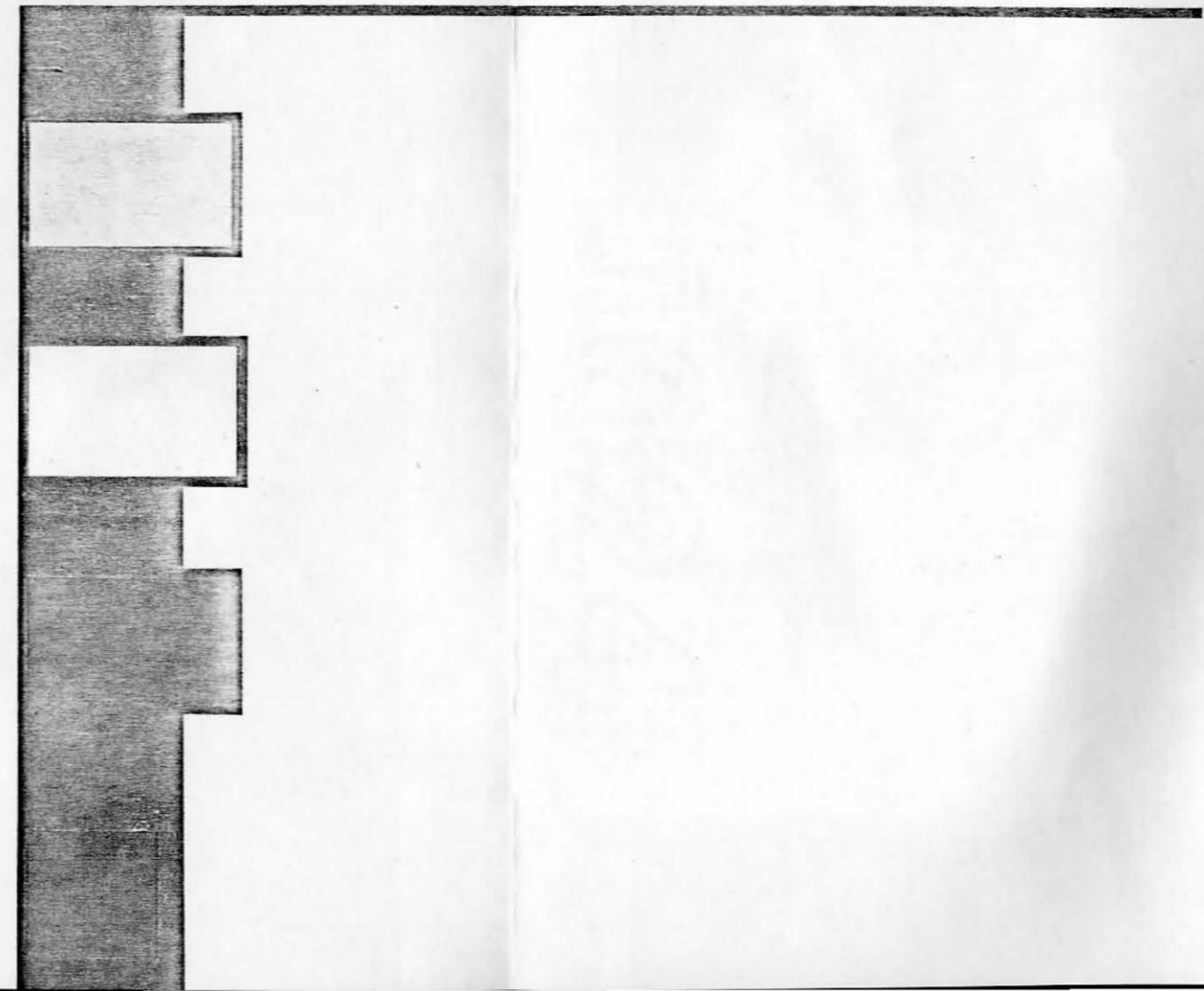
Calcium



Vitamin C



Iron



VITA

Thomas R. Lee

Candidate for the Degree of  
Master of Science

Thesis: Nutritional Understanding of Preschool Children  
the Home and Child Development Laboratory

Major Field: Family and Human Development

Biographical Information:

Personal Data: Born at Los Cruces, New Mexico, 1952, son of W. Grant and Virginia S. Lee.  
Frischnecht December 15, 1978.

Education: Attended elementary school in first grade and  
and Vienna, Virginia; graduated from Pleasanton High School,  
Salt Lake City, Utah, 1971. Received the Bachelor's degree  
degree in sociology, from the University of Utah, 1975.  
Completed the requirements for the Master's degree in  
in Family and Human Development at Utah State University  
in 1979.

Professional Experience: 1977-78, Assistant Professor,  
University; 1978-79, Head Teacher,  
Laboratory.

\*\* PIZZA WITH CHEESE & SAUSAGE TOPPING, HOME RECIPE, 14" DIA 1/8 13-3/4 INCH  
76 GRAMS WHICH SUPPLY 214 CAL OF ENERGY

Honors Received: Graduated Cum Laude  
Recipient of the Family Life, Utah

Presentations: Present July 16-17, 1979,  
Presenter, Annual Education, San Francisco

NUTRIENT	UNIT	AMOUNT	INQ	%	STD	0	25%	50%	75%	100%
ENERGY	CAL	214.32	1.00	12	EEEEEEEEEE					*
PROTEIN	G	4.80	2.74	33	PPPPPPPP*PPPPPPPPPPPPPPPP					*
VITAMIN A	IU	418.00	1.40	17	AAAAAAAAAA*AAA					*
VITAMIN C	MG	6.84	1.44	17	CCCCCCCC*CCCC					*
THIAMIN	MG	0.06	0.57	7	TTTTT *					*
RIBOFLAVN	MG	0.14	1.04	12	RRRRRRRRR					*
NIACIN	MG	1.06	0.74	9	NNNNNNN *					*
CALCIUM	MG	142.84	1.50	18	KKKKKKKK*KKKK					*
IRON	MG	1.06	0.89	11	IIIIIIII*					*

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# Pizza

## VITA

Thomas R. Lee

Candidate for the Degree of

Master of Science

Thesis: Nutritional Understanding of Preschool Children Taught in  
the Home and Child Development Laboratory

Major Field: Family and Human Development

## Biographical Information:

Personal Data: Born at Los Cruces, New Mexico, September 11,  
1952, son of W. Grant and Virginia S. Lee; married Kathie J.  
Frischnecht December 15, 1978.

Education: Attended elementary school in Arvada, Colorado,  
and Vienna, Virginia; graduated from Highland High School,  
Salt Lake City, Utah, 1971. Received the Bachelor of Art  
degree in sociology, from the University of Utah, 1977.  
Completed the requirements for the Master of Science degree  
in Family and Human Development at Utah State University  
in 1979.

Professional Experience: 1977-78, Research Assistant, Utah State  
University; 1978-79, Head Teacher, Child Development  
Laboratory, Utah State University.

Honors Received: Graduated Cum Laude, University of Utah, 1977.  
Recipient of the Leah D. Widstoe graduate fellowship in  
Family Life, Utah State University, 1978-79.

Presentations: Presentor, Insights into Early Childhood Workshop,  
July 16-17, 1979, Utah State University.  
Presentor, Annual Meeting of the Society for Nutrition  
Education, San Francisco, July 22-25, 1979.