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THE EFFECT OF PARENT INVOLVEMENT IN A
NUTRITION EDUCATION PROGRAM
FOR PRIMARY GRADE PUPILS

by

Barbara A. Kirks

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

of

DOCTOR OF EDUCATION

in

Curriculum Development and Supervision

with a specialization in

Nutrition Education

UTAH STATE UNIVERSITY
Logan, Utah

1981

DEDICATION

The completion of this dissertation is dedicated to my parents, Ruth and Warren Barry, who instilled in me the belief that, despite whatever obstacles, anything is possible.

ACKNOWLEDGEMENTS

Acknowledgement for the funding of this project is made to the Nutrition Education and Training Program, Bureau of Child Nutrition Services, California State Department of Education.

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Barbara A. Kirks

TABLE OF CONTENTS

	Page
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	viii
 Chapter	
I. INTRODUCTION	1
Background of the Problem	2
Statement of the Problem	2
Purpose of the Study	3
Research Design	4
Hypotheses to be Tested	4
Limitations to the Study	5
II. REVIEW OF RELATED LITERATURE	8
Evaluation of Nutritional Status	9
Importance of Early Learning	10
Nutrition Education in Schools	11
Inadequacies of Past Programs	12
Nutrition Education in the Home	13
Nutrition Education and Training Program (NETP)	14
III. METHODOLOGY	17
Introduction	17
Subjects	18
Pilot Studies	19
Instruments	22
Procedures	26
Analyses	36
IV. RESULTS	37
Introduction	37
Findings	37

Chapter	Page
V. DISCUSSION OF RESULTS	51
Summary of Major Findings	51
Discussion and Implications	52
Conclusions	65
Recommendations	66
REFERENCES CITED	68
APPENDICES	73
Appendix A. Introductory Letter	75
Appendix B. Initial Parent Survey	76
Appendix C. Food Record Form	77
Appendix D. Parent Newsletters	78
Appendix E. Letter of Introduction to Parents of Treatment School Children	91
Appendix F. Letter of Introduction to Parents of Control School Children	92
Appendix G. Letter Accompanying Food Record and Release Form	93
Appendix H. Reminder Letter to Parents	94
Appendix I. Teacher Evaluation of Lesson Form	95
Appendix J. Minimum Proficiency Levels for California's Nutrition Education Program	96
Appendix K. Original Food Recall Form	99
Appendix L. Staff Self-Assessment, Level I (Preschool - Grade 3)	100
Appendix M. Outline for Teacher Inservice Nutrition Course, Chico Unified School District, 1979-1980	105
Appendix N. Kindergarten Posttest - Sample Item	108
Appendix O. Cognitive Posttest - Grades One-Three	109
Appendix P. Affective Posttest - Grades Two and Three	119
Appendix Q. Nutrition Posttest for Participating Teachers	124
Appendix R. Analysis of Variance for Cognitive Pretests	128
Appendix S. Analysis of Variance for Kindergarten Posttest	129
Appendix T. Analysis of Variance, Grade One-Three, Postcognitive Scores with the Precognitive Score as the Covariate	130
Appendix U. Analysis of Variance for Cognitive Posttest by School	131
Appendix V. Analysis of Variance for Affective Pretest	132
Appendix W. Analysis of Variance for Affective Posttests	133
VITA	134

LIST OF TABLES

Table	Page
1. Initial Sample (N)	20
2. Instrument Reliability Coefficients	27
3. Mean Differences for Diet Record Items by School	38
4. Pretest Cognitive Scores by School by Grade Means and Standard Deviations	39
5. Results of Kindergarten Cognitive Posttests	40
6. Adjusted Deviation Mean Percent Scores \pm Standard Deviations for Cognitive Posttest by School by Grade	44
7. Affective Pretest Scores by School by Grade	45
8. Results of Affective Posttests Adjusted Mean Scores	46
9. Correlation of Posttest Scores with Changes Between Preplate and Postplate Waste Analyses	47
10. Changes (\pm) in Food Items by School Between Preplate and Postplate Waste Analyses	48
11. Total Grams of Plate Waste in Posttest Phase by School by Grade (Mean \pm Standard Deviation)	49
12. Changes (\pm) in Grams of Total Plate Waste by School by Grade .	50

LIST OF FIGURES

Figure	Page
1. Cognitive Test Postscores by Grade	42
2. Cognitive Test Postscores by School	43

ABSTRACT

The Effect of Parent Involvement in a Nutrition Education
Program for Primary Grade Pupils

by

Barbara A. Kirks, Doctor of Education

Utah State University, 1981

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Food Sciences

Program Chairman: Eldon Drake, Department of Secondary Education

Department: Curriculum Development and Supervision (Nutrition Education)

Three schools were matched for socioeconomic data, location, and quality. Students in kindergarten through grade three in two schools received nutrition education; the third school was the control. Of the two treatment schools, one was randomly assigned to receive parent as well as student education in nutrition. Three-hundred and seventy cognitive scores, 168 affective scores, and 100 plate-waste analyses were collected in both pretest and posttest phases. At the end of the four-month treatment period, 24-hour food frequency recalls were collected for 151 children.

Students at the school where both parents and their children were involved had higher dietary quality scores and were eating a wider variety of food compared to students in either of the other two schools. Cognitive scores for kindergarten and first grade students were significantly higher for children in the school with parent involvement. The

results substantiate the importance of a parent education component in achieving a positive effect in food behavior as a result of a nutrition education program.

(145 pages)

CHAPTER I

INTRODUCTION

The teaching of nutrition in elementary schools is a recent innovation. The White House Conference of 1969 recommended that nutrition education be incorporated into elementary and secondary school curricula (U.S. White House, 1969). Subsequently, attempts have been and are being made to educate all age levels of the population in both concepts of nutrition and the value of developing good food habits (Maretzki, 1979; National Nutrition Consortium, 1980). Since health habits are easier to form than to change, beginning to educate children about nutrition as early as possible is most desirable (Beyer & Morris, 1974; Robinson, 1976).

Selection and consumption of nutritious foods by the learner is an inherent goal of any nutrition education program. If the general nutritional status of the nation is to improve, the learner must be able to transfer his knowledge to behavior at the earliest possible moment. For children, the attainment of this goal is limited primarily by the particular foods made available to them in the place of usual consumption (i.e., the home) and by the encouragement of the respective caretaker to consume the food available.

The influence of parents' food habits on choices of food by the child has been studied (Birch, 1979; Burt & Hertzler, 1978). It remains to be ascertained, however, that concomitantly exposing parents to nutrition information can have a positive influence on the child's eating patterns in the home. It further remains to be determined that a nutrition education program where parents may or may not be involved will be

more or less successful in improving nutrition knowledge and attitude scores of the students as well as decreasing plate waste.

Background of the Problem

Since the passage of the Nutrition Education and Training Act (pp. 95-196) in 1977, monies have been available from the United States Department of Agriculture to states and local school districts for development and implementation of nutrition education curriculum in grades K-12. As a result, state departments of education, industry, and agencies addressing special populations have attempted to improve the conceptual teaching of nutrition, which should theoretically result in an increase of knowledge, improvement in attitudes and, ultimately, demonstrable behavior in that students will practice good nutrition habits (Leverton, 1974; Egan et al., 1980). Although a parent component has been recommended for these projects (U.S. White House, 1969; American Dietetic Association, 1974; Dwyer et al., 1970), it has not been mandated. At best, an awareness of nutrition may be carried home from the child to the parent. Intensifying this awareness with directed nutrition materials for the parent as well as the child may or may not act as an adjunct in achieving the major goal of nutrition education: improving the health status of the population through the formation of good food habits.

Statement of the Problem

The problem addressed by this study is to determine what outcomes will be derived from a nutrition education project when parents as well as their children are involved in the program. The effects will be measured in terms of students' cognitive learning of nutrition concepts, development of positive attitudes about nutrition, and eating habits at

home and in the school lunchroom. The results will provide guidelines for future nutrition education programs in elementary schools.

The end result of a nutrition education program should be the development and internalization of a personal commitment toward good nutrition habits on a long-term basis (Robinson, 1976, p. 129). Although students may show increased knowledge as a result of nutrition education programs, this knowledge alone cannot guarantee an improvement in behavior in terms of food habits (Yperman & Vermeersch, 1979). If the child is to transfer the classroom learning to his total daily diet, parents must provide a wide variety of nutritious food in the home for meals and snacks. The attitudes in the home regarding food and nutrition must reinforce the learning done at school (U.S. White House, 1969; American Dietetic Association, 1974). Hence, it seems apparent that parents need to be involved in a nutrition education program if it is to be truly effective. As important as this concept may be, the literature shows only one very limited and inconclusive study which measures the effect of parent education in a nutrition education program (Smith & Justice, 1979).

Purpose of the Study

The purpose of this study is to resolve the question of whether parent involvement in a nutrition education program results in better food habits by the students in terms of dietary quality and food diversity. The study will also attempt to ascertain the degree to which parent involvement is reflected in their children obtaining higher scores in tests of nutrition knowledge and attitude at the end of the test period. Additionally, plate-waste studies will be conducted to determine

if there is a more significant decrease in food waste in school lunch for children in the group whose parents were involved in the educational effort as compared to a matched group of children whose parents were not involved.

Research Design

All students in schools matched by socioeconomic status, location, and quality will receive education from the same curriculum. Classroom instruction will be done by the respective teachers, all of whom will receive inservice training at the same sessions. Pretesting and post-testing for nutrition knowledge and attitudes, as well as cafeteria plate-waste studies, will be conducted in two treatment schools and one control school. In addition, intensive parent involvement through a variety of strategies will be directed at the parents of students in one of the schools. The involvement of parents is the independent variable, and the measurement of its effect on outcomes of each test instrument is the major focus of this study.

Hypotheses to be Tested

1. Intensive parent involvement strategies will not result in better food habits by the students as measured by dietary quality and food diversity scores.
2. There will be no difference in the cognitive scores of the students at any of the schools tested.
3. There will be no difference in the affective scores of the students at any of the schools tested.
4. There will be no difference in the plate waste from school lunch at any of the schools tested.

5. There will be no correlation between the teachers' posttest scores and their respective classroom mean cognitive scores.

6. There will be no correlation between cognitive or affective scores and plate-waste scores.

Hypotheses will all be tested at the .05 level of significance. Analysis of covariance for cognitive and affective scores, and analysis of variance for other instruments, will be used. Differences between means will be determined by appropriate post-hoc tests.

Limitations to the Study

It is beyond the scope of this study to ascertain the following:

1. Whether parent involvement in any form which resulted in parent-child interaction would have been associated with a change in food behavior;
2. Whether parent education alone would have resulted in a change in the child's eating behavior;
3. Measurement of parent nutrition knowledge or attitudes in the prephase or postphase;
4. A pretest of the child's food choices before the treatment;
5. Actual observation and recording of food eaten by or served to the child in the home.

Definition of Terms

Affective test - an instrument designed to measure attitudes.

Cognitive test - an instrument designed to measure knowledge.

DAYREQ - a computerized program which calculates the percentage of the

Recommended Dietary Allowances (National Research Council, Food and

Nutrition Board) which are present in a given list of foods.

Dietary quality - a quantitative score given to a diet based on how well it meets recommended standards for a given period of time.

Food diversity - the function of the total number of foods consumed by a child during a 24-hour period, based on the notion that the key to a nutritionally adequate diet is a variety of different foods (Caliendo & Sanjur, 1978, p. 70).

Food recall (24-hour) - a list, from the client's memory, of food eaten in the 24 preceding hours.

Food record - a form for recording food intake, OR a list of food eaten by an individual in a specified period of time.

Food frequency - the number of times in a given period that a specific food was consumed.

Malnutrition - a state of disease caused by the sustained deficiency, excess, or imbalance of the supplies of calories, nutrients, or both, that are available for use in the body.

Nutrition - a series of processes by which an organism ingests and assimilates the nutrients necessary for body function.

Nutrition education - the process of applying a knowledge of nutrition, related scientific information, and the social and behavioral sciences in ways designed to influence individuals and groups to eat the kind and amounts of foods that will make a maximum contribution to health and social satisfaction.

Nutrition educator - a person who conducts nutrition education.

Nutritional status - the physical health of a person as it results from consumption and utilization of food in the body.

Nutritionist - a person whose primary discipline is nutrition and whose

major work is in the field of nutrition, especially in activities designed to promote health or prevent or control disease.

Plate waste - the amount of food left on a consumer's plate after eating.

SI school - school in which students only are involved in the nutrition education program.

SPI school - school where both parents and students are receiving nutrition education.

SPSS - Statistical Package for the Social Sciences. Computer programs for use in social research.

CHAPTER II

. REVIEW OF RELATED LITERATURE

Surveys evaluating the nutritional status of the United States population have demonstrated nutritional deficiencies at all socioeconomic levels in a nation with a more-than-adequate food supply (Frankle & Owen, 1978). Further, the problems which are seen as being linked to overnutrition (e.g., obesity, coronary heart disease, and dental caries) indicate that Americans are misusing their food supply (Department of Health, Education and Welfare, 1979). Nutrition information regarding food composition and the ill effects of poor nutrition has never been more abundant, yet there exists a great gap between nutrition research and effective consumer use of information (Poolton, 1972; Robinson, 1972).

Nutrition education has been largely a "hit-and-miss" proposition. It has been well established that food habits are formed in early years (Head, 1974; Beyer & Morris, 1974; Carver & Lewis, 1979), but it has also been shown that many adults who fulfill the role of "gatekeeper" (Lewin, 1943) are themselves seriously lacking nutrition information and/or sufficient motivation to make necessary changes in their own eating behavior (Emmons & Hayes, 1973; Todhunter, 1969; Caliendo & Sanjur, 1978).

The school classroom is a logical starting point for reversing this trend; indeed, parents stated to a Senate committee that they expected their children to learn about nutrition at school (Richmond, 1977). Massachusetts has provided leadership in developing a sequential curriculum guide which has been a prototype for many state departments of edu-

cation as well as local districts (Callahan, 1973). However, the only agency which has developed a curriculum and evaluated its effectiveness and generalizability is the Dairy Council of California which has, after five years, trained 75 percent of the second and fifth grade teachers in that state (Lovete et al., 1970; Young, 1977). This program/agency provides a two-hour inservice training by a nutritionist, as well as all teaching materials for participating teachers. Cognitive scores of students using this curriculum increase significantly. Similar findings were reported in a Canadian replication (Cooper & Philips, 1974). The curriculum is based on classification of the four food groups, with no actual measurement made in food consumption.

In the past few years there have been several new curricula developed in local school districts for teaching nutrition. This change has come about as a result of public demand and the availability of public funds for the development and implementation of nutrition education. Although parent involvement is frequently recommended, a review of the literature showed a limited number of attempts to successfully involve and educate parents as well as students. Moreover, measurement of the effect of parent involvement is limited to one small study (Smith & Justice, 1979).

Evaluation of Nutritional Status

In 1967, Congress directed the Department of Health, Education and Welfare to conduct a survey to identify the incidence, magnitude, and location of malnutrition and related health problems within the United States. Although such information was available for 33 countries, no such data had been collected, other than for subpopulations, within the

United States (Schaffer, 1969). Consequently, the Ten-State Nutrition Survey was completed, followed by HANES I (Health and Nutrition Examination Survey I) and HANES II. Findings of those surveys indicated that children of school age are at a vulnerable state of nutrition risk. Furthermore, specific nutrient deficiencies in this age of children were noted (namely, vitamins A and C, iron and calcium), as well as the prevalence of overweight, underweight, and dental problems (Department of Health, Education and Welfare, 1973). A study in Phoenix, Arizona, reported that more than one-half of the children examined there had diets which failed to meet two-thirds of the Recommended Dietary Allowances (Patterson, 1971). Whitehead (1960) concluded that sixth and seventh graders in Kansas City, Missouri, consumed less milk, eggs, butter or margarine, potatoes, and green leafy vegetables than was recommended by USDA standards based on Recommended Dietary Allowances (NRC). Frank et al. (1977), in a study of rural children from ten to 16 years old, found iron, calcium, and vitamin A levels below recommended amounts.

Conclusions from these and other studies indicate that, in all socioeconomic levels, nutrition knowledge is not being transferred to improvement of food habits (Department of Health, Education and Welfare, 1979). In spite of attempts to increase nutrition information, a nutrition education program which results in consuming a mix of food which supplies nutrients of the acceptable standard has not been reported.

Importance of Early Learning

It is highly recommended that nutrition education begin at the earliest possible age. Indeed, food habits are much easier to learn than to unlearn and/or relearn (Lowenberg, 1977).

Several studies have established that early elementary years are the opportune time to establish good dietary habits. Petersen and Kies (1972) pointed out that school is a major influence on the habit formation of young children and, thus, the elementary classroom teacher can play a significant role in food habit formation. This concept has been reiterated in many ways by other authors. Sodowsky (1973) indicated that the earlier in the child's life that nutrition education can be implemented, the more positive will be the results. A study by Head (1974) showed that elementary school children learned from a nutrition curriculum better than their junior high or high school counterparts in the same study. Similar findings have been shown by other authors (Beyer & Morris, 1974; Baker, 1972). Robinson (1976), noting the failings of nutrition education to date, urged that preventative nutrition be started at the earliest possible age to "assure maximum effectiveness and establish patterns of behavior to carry over into adult life" (p. 128).

Nutrition Education in Schools

The recommendation of the 1969 White House Conference on Food, Nutrition and Health suggested that a "comprehensive and sequential program of nutrition education be included as an integral part of the curriculum of every school in the United States and its territories" (p. 153). Robinson (1976), referring to nutrition education in school classrooms, stated that "nutrition education must be related to major health problems existing . . . and, therefore, be built on a broader and more complex base than that which exists through traditional approaches" (p. 131). Robinson's mandate to nutritionists is to make nutrition education available. However, the ratio of dietitians/nutritionists to

teachers is 1:20,000 (Callahan, 1973); thus, it is totally unfeasible for dietitians to attempt to teach nutrition in schools. Another channel (i.e., teacher inservice or preservice) is the most expedient approach.

Whitehead (1960), in reviewing the history of nutrition education since 1900, concluded that the teacher who is with the child all day is the logical person to handle the teaching of nutrition concepts. Furthermore, a more favorable reaction to nutrition lessons has been found when the classroom teacher becomes involved in a nutrition workshop and teaches the lesson (Lovete et al., 1970; Bell & Lamb, 1973; Callahan, 1973; Head, 1974; Cooper & Philips, 1974).

Inadequacies of Past Programs

In spite of the fact that several curricula have been developed and tested, many reports indicate that the traditional approaches (i.e., teaching cognitive information) have been ineffective in changing food habits, attitudes, and behavior and, thus, the nutritional status of the children has not been substantially improved. Poolton (1972) has stated concern for the poor application of nutrition principles in daily food habits. Baker (1972) found little change in nutrition values of fourth and fifth graders' diets after a three-week nutrition education program. Kirk et al. (1975) evaluated a program in which nutrition education was given primary emphasis in the classroom, but the nutritional status of the children was not improved. The authors' conclusion was that the poor results were caused by lack of effectiveness of the traditional approach used in teaching nutrition.

Hence, there is little evidence in the literature to show changes

in eating habits (or food choices) after conclusion of a nutrition education program. Only one study (Smith & Justice, 1979) involved the parents of the students who were receiving a nutrition education program. Further, no studies show both the effect of parent involvement on foods available at home and, at the same time, measure the effect of the entire program on the student.

Nutrition Education in the Home

The influence of the home in establishing and promoting food habits cannot be overestimated. Yperman and Vermeersch (1979) have demonstrated that "children are better able to retain nutrition knowledge gained at school when it is reinforced by conditions in the home that are favorable to good nutrition practices" (p. 72). Although parents traditionally control the family food supply, research has shown that many homemakers are unable to define what constitutes a balanced diet. A survey done by Emmons & Hayes (1973) concluded that mothers had little knowledge of nutrition, and their children had even less. These authors strongly urged the establishment of nutrition education programs in schools, hoping that this kind of measure would have a positive impact upon the nutritional status of the entire family.

Caliendo and Sanjur (1978) state that "the family directly influences dietary practices as it provides the child with food and nutrients and indirectly influences by transmission of attitudes, preferences and other environmental factors which affect the child's lifetime eating patterns" (p. 69). In a path analysis model, these authors show the effects of both nutrition education of the mothers and dietary diversity scores in improving the dietary status of the preschool children due to

change in the mothers' attitude.

Although mothers have traditionally been shown to be the "gate-keeper" (Lewin, 1943) in the establishment of the child's food habits, recent studies have shown that fathers' food preferences are just as important, if not more so, in determining foods purchased for home consumption (Burt & Hertzler, 1978; Helnick, 1978). Thus, the involvement of both parents in the parent component of a nutrition education program must be emphasized.

Nutrition Education and Training Program (NETP)

Because of the national need for nutrition education, Congress enacted Public Law 95-196 on November 10, 1977, thereafter known as the National School Lunch Act and Child Nutrition Amendments (Maretzki, 1979). This legislation granted to each state 50 cents per child enrolled in the United States Department of Agriculture subsidized school lunch program for years 1978, 1979, and 1980. This money was to be used specifically "to teach children, through a positive daily lunchroom experience and appropriate classroom reinforcement, the value of a nutritionally balanced diet, and to develop curricula and materials and train teachers and food service personnel to carry out this task" (Maretzki, p. 176). The money was granted in blocks to state departments of education, which then made it available to local school districts and other educational programs on a competitive basis. Because of the delay in determining the method of implementation and actual distribution of funds, money was not locally available until the 1979-80 school year.

In California, however, the state legislature had provided money for the development of nutrition education curriculum since 1975. Six-

teen school districts were provided state funds on a competitive basis in 1976 to accomplish this task. When the federal funds became available, these 16 projects became dissemination bases for development of the to-be-adopted California state curriculum for nutrition education. Each of these projects had had an evaluation component and had been tested for effectiveness. Successful lessons were adopted into the new curriculum guide.

The California Health Education Framework (Fodor, 1969) lists five major "concept areas" for nutrition as a discipline. These are: (1) food choices, (2) food-related behavior, (3) consumer competencies, (4) food-related careers, and (5) food handling and sanitation. Within each of these five areas, proficiencies were established for five levels of education: preschool/kindergarten, early childhood (ages six to eight), preadolescent (ages 9 to 11), adolescent (ages 12 to 15), and young adult (ages 16 to 18) (Appendix J). In addition to meeting the concept foci directed by the State Department of Education, the proficiencies also meet the recommendations of the White House Conference on Food, Nutrition and Health of 1969.

The curriculum guide provides lessons for each grade level which address the minimum proficiencies as established. Instruments were developed for pretests and posttests, with items selected from each proficiency. These instruments were field tested by an independent evaluator on a statewide sample of both control and "exposed" students in matched groups. An evaluation report determining the effectiveness of the curriculum in terms of student knowledge and attitudes was submitted to the State Department of Education (Wolff, 1980).

In effort to measure change in food consumption as an indicator of

changed behavior resulting from the nutrition education, plate-waste studies were required for all funded projects. The amount of each food item which was remaining on the tray of a student after lunch was weighed for two days in the pretest phase and again at the conclusion of the treatment. Identical menus were used in both phases.

Although the curriculum suggests a parent component, one was not included. Thus, the curriculum did not call for specific carryover of treatment to the home, where the child would ultimately use the majority of the knowledge and attitudes acquired in the classroom.

CHAPTER III

METHODOLOGY

IntroductionPurpose and Objectives

Determination of the effects of parent involvement on dietary habits of their children who are participating in a nutrition education program has been the major purpose of this study. Attempt was also made to ascertain whether or not parent involvement affected the classroom learning of the children, as opposed to children whose parents were not involved in the program. The development of positive attitudes regarding nutrition was also measured to discover if concomitant parent education was significant. Plate-waste studies were also performed in an attempt to measure the effect of the nutrition program on lunchroom food behavior.

Research Design

During the 1979-1980 academic year, a nutrition education program was implemented in grades kindergarten, one, two, and three in several schools in the Chico (California) Unified School District. Two of the participating elementary schools and a control, based on location and socioeconomic data, were matched for this study. One of the two matched schools was randomly assigned to receive parent education, as well as classroom instruction for the children. The other school would have student participation only. The control school was not exposed to either parent or student participation.

Pretesting and posttesting for cognitive, affective, and plate-waste measures were done for grades two and three at all three schools. Cognitive testing and plate waste were done for grades one and kindergarten. Food records for the children participating in all three schools were solicited from parents and analyzed for dietary quality and food diversity at the end of the study.

Subjects

Target and Accessible Populations

The target population of this study is identified as primary grade school children from upper socioeconomic families. In schools where a wide cross section of the socioeconomic population is present, the reading ability as well as other demographic factors vary. By limiting the study to a specific level, such intervening variables could be reduced to a minimum.

Three schools in the Chico (California) Unified School District were identified as the accessible population. Two of these schools were participating in a district-wide nutrition education program, and one was designated as a matched control. This population, then, is also the accessible population in this case. However, it is hoped that any results may be generalized to similar populations in other parts of the United States in spite of this limitation.

Sample Population

The greater Chico area is a mid-size city located in the rural Sacramento Valley and has a population of approximately 70,500. It is the largest city in Butte County, which has a population of 128,000. The

city services many small communities in the northern Sacramento Valley, with a service population of over 250,000. One of the campuses of the California State University system is located in Chico and is one of the main reasons in the choice of location for many people.

Socioeconomic indexing of schools in the Chico Unified School District was obtained from the California State Department of Education's Assessment Office. Each year, every third grade child takes a test that is sent to this particular office. On the back of the test, the teacher indicates the socioeconomic status of the child's family by checking one of five boxes referring to the employment status of the family's main source of income. Three schools in the district were ranked in the 79th-81st percentile of socioeconomic status in California according to the Assessment Office. Two of the schools were included in the nutrition education project, and the third was used as a control.

All three schools are located in the northeast area of the city and have similar populations of teachers, students, and principals. The teachers at all schools represent a range of experience ranging from two to 15 years. Classrooms in all three schools range from being very structured to somewhat "open." The control school is smaller in total number of students than the other schools but is similar in other features.

Pilot Studies

Food Record

To assess food behavior in the home as a reflection of the impact of parent education, an instrument was developed to measure dietary information reported from the home. Of prime importance in the collection

of these data was that it be in a form which would encourage response as well as insure as much accuracy and validity as possible. While it is desirable to obtain as many days' food records as possible, the 24-hour recall has the greatest chance of being returned. It has been reported to have as much validity as a three-day food record when used to compute mean scores. A seven-day record is nearly impossible to obtain under ordinary circumstances (i.e., outside of living institutions) and is reported to have a very low validity after the third day (Gersovitz et al., 1978).

Table 1
Initial Sample
(N)

Grades	SI(a)	Schools	
		SPI(b)	Control
K	43	28	28
1	31	43	19
2	25	43	32
3	41	62	26

(a) = Student involvement.

(b) = Student and parent involvement.

The initial form developed for this study requested parents to actually record all the foods eaten by their child for 24 hours. After presenting it to a sample of 12 parents, it was decided that the large blank spaces were somewhat intimidating (Appendix K). A food frequency-

type list was then developed. This list contains the 20 foods reported to be eaten most frequently by young children (Caliendo & Sanjur, 1978; Frankle & Owen, 1978). The parents were asked to tally each food listed (e.g., number of times eaten) for a 24-hour period. For specific diversity within six food groups, the parents were asked to supply a list of foods in each group (e.g., vegetables) that the child would eat (Appendix C).

This instrument was pilot tested with serving sizes (e.g., one-half cup) listed after the particular food in the list of 20. The pilot study was done on a sample of 22 parents of similar socioeconomic status with children in primary grades. The results indicated that the serving sizes were confusing, too time consuming, and intimidating. In interviewing these sample parents, it was obvious that the accuracy of the serving sizes would be questionable, making analyses for individual nutrients invalid. The final form eliminated the serving sizes and was returned with commendable comprehension from a fairly large number of respondents. This decision to remove serving sizes also removed the possibility of doing computerized dietary analyses for the children. Dietary "quality" and "diversity" scores would be used instead, thereby insuring that the validity of the findings would be as accurate as possible (Caliendo & Sanjur, 1978).

Cognitive and affective tests. All tests administered in the classrooms were pretested in classrooms of appropriate learning level and refined before administration at local levels. This was done by the evaluator for the California State Department of Education. The tests were piloted with a statewide sample.

Instruments

Cognitive and Affective Tests

All cognitive and affective tests were developed by a team of nutritionists and curriculum specialists, including this researcher, plus elementary school teachers and curriculum specialists at the California State Department of Education.

Reliability coefficients were calculated for each test using Cronbach's alpha. An item analysis was done in order to determine the difficulty and discrimination levels. Reliability coefficients were recalculated after removing items which were marked right or wrong by 100 percent of the respondents.

The tests were developed for the appropriate developmental level of the children. Validity of each question was checked with the curriculum. Standard conditions of testing were followed. All testers were trained by the project director, who circulated among schools during the testing. Kindergarten children were tested individually; first grade children were tested in groups of ten; second and third graders were tested in one session per class.

Cognitive tests. The curriculum used in the program addresses five major proficiency areas at each grade level. These include: food choices, factors influencing food choices, food-related careers, consumer competencies, and food handling. Thus, identical test items could be used at all three levels (i.e., grades one through three) without sacrificing validity. Because many first graders cannot read, pictures as well as words were used for all 30 items. The same questions were used for the grade two-three version, but without pictures. Sample questions

were placed first on each test to ensure that the children understood the directions (Appendix O).

Affective tests. Five major constructs were the basis of the attitudinal concepts in the curriculum. These included social influences (peer pressure), health, enjoyment of food, convenience, and consumerism. The development of these concepts began in the second grade curriculum; thus, only grades two and three were tested for affective scores (Appendix P).

Classroom Attention to Treatment

An instrument which measured the time devoted to the treatment was also developed. This was a short questionnaire with one open-ended and six scaled items. The questions were administered to the classroom teachers at both experimental schools at the weekly visit by the staff nutritionist (Appendix I). The questions ascertained the teacher's utilization of the curriculum guide and materials, time spent weekly on nutrition lessons, whether or not the lessons were being integrated into other disciplines, pupil enthusiasm, and difficulty of the lesson. Answers were related on a scale of one to five. The open-ended question related to which lesson(s) the teacher had used in the previous week.

Test of Teacher's Knowledge

A self-assessment (Appendix L) before the beginning of the inservice was returned by only one-half of the teachers and revealed that the teachers knew very little about the principles of nutrition which one would need to know in order to teach the nutrition lessons effectively. The content of the inservice training was based on these results. A multiple-choice test based on these concepts was administered to the

teachers near the end of the treatment period. A reliability coefficient was calculated for this latter test. The teacher's score on this test was correlated with the mean cognitive score for each respective class.

Plate Waste Measures

In measuring plate waste, two gram scales were used at each school. All scales were calibrated. Samples of five trays of food were randomly selected from the unserved tray line and food weighed to the nearest gram. Each food item (e.g., vegetables) was weighed individually. An average was then calculated in order to determine a standard of comparison per school; a standard amount of each food was served at all three schools. Plate waste for each food item remaining on a student's lunch tray was individually weighed and recorded. By chance, the recess at the control school was switched to the prelunch period on one day of the study, which presents a limitation in this measure.

Record of Home Consumption

A food-frequency record developed in a pilot test was used to obtain information from the parents regarding the food eaten by the child in the home. The record was analyzed for quality on a scale of one to six and food diversity based on total number of foods eaten. Both measures have been described by Caliendo and Sanjur (1978, p. 78). The food quality score is based on the four major food groups, with appropriate number of servings per day per age. One point is given for each complete group, plus one point for a vitamin C-rich food and one point for a vitamin A-/folic acid-rich food.

The food diversity is defined as a "function of the total number of

foods consumed by the child during a one-day period," and is "based on the notion that the key to a nutritionally adequate diet is a variety of different foods" (Caliendo & Sanjur, p. 70). A diversity score was developed, then, to measure the food variety in the population being studied. Theoretically, homes in which parents are also receiving nutrition information will provide meals and snacks with a wider diversity of foods and, therefore, a larger potential source of nutrients for their children.

Validity of the Instruments

All cognitive tests were carefully constructed and reviewed for content validity. Affective tests were designed, constructed, and reviewed for construct validity. Questions from each proficiency area were used to insure sampling validity. Predictive validity could only be determined by carefully observing the subject's later behavior in terms of the development of long-term good eating habits and is beyond the scope of this study.

The validity of the children's food records may be considered to be high, as the second-day recall from 20 percent of the families resulted in a correlation coefficient of .95. The second day's recall was obtained verbally rather than in writing. The information was received by the rater in an entirely different form, then recoded and scored. It would not have been possible for the caretaker to have related the same information twice if it had not, in fact, been valid.

Reliability of the Instruments

Coefficients of reliability for all cognitive and affective instruments are reported in Table 2. Except for the affective pretest, these

values were obtained from the results of a statewide sampling. The affective pretest coefficient was obtained from sample data. All coefficients for student tests were determined using Cronbach's alpha.

The reliability of the teacher's posttest was calculated according to the Kuder-Richardson 21 method, which resulted in a value of .65. There were a total of 30 teachers who took the test, which consisted of 40 items. The value was recalculated after removing all items which were either all incorrectly or correctly scored by all the subjects. However, the recalculated value was essentially the same.

In order to measure the reliability of the instrument used to obtain home dietary information, a second day's record was obtained from a random sample of 20 percent of the respondents. This was done by telephone interview to the parents, asking them to recall what their child had consumed during the past 24 hours. This information was transformed to the food-frequency form and scored. Correlations of the first and second days' intakes from this sample were .95.

Procedures

Teacher Inservice

All teachers in both treatment schools received 15 hours of inservice training from this researcher, who was the project director. Because teacher preservice training rarely includes any study of nutrition as a discipline, the inservice was imperative in order that appropriate classroom instruction be accomplished (Callahan, 1973; Cook et al., 1977).

The overall goal of the inservice was to give the teachers confidence and insight which would assist them in effectively teaching the lessons in the curriculum. An outline for the inservice is in Appendix

Table 2
Instrument Reliability Coefficients

Test	Grade Level	Sample N	Coefficient
<u>Pretests</u>			
Precognitive	K	325	.66
	1	331	.51
	2	379	.53
	3	325	.72
Preaffective	2-3	222	.45
<u>Posttests</u>			
Postcognitive	K	200	.69
	1	115	.60
	2	251	.79
	3	271	.79
Postaffective	2	251	.71
	3	271	.60

M. Specific objectives of the inservice were:

1. To provide sound, scientific information about major nutrients and their relationship to the healthful functioning of the body (Guthrie, 1978);

2. To demonstrate that food experiences are the foundation of nutrition education (Maretzki, 1979);

3. To encourage sharing of teaching experiences among the teachers;

4. To enable the teachers to discriminate facts from fallacies regarding the benefits and risks of food processing;

5. To provide information about common problems in child nutrition, particularly obesity, dental caries, and food allergies;

6. To assist teachers in using the curricular materials;

7. To create an awareness in the teachers concerning the importance of nutrition in daily life so they would be encouraged to teach nutrition in their classrooms; and

8. To assist the teachers, and through them their students, in developing the ability to combat misinformation confronting them through mass media (Grogan, 1978).

An introduction to the curriculum and overview of the project was given at each of the two treatment schools. At this meeting, a self-assessment of basic nutrition knowledge was given to each teacher (Appendix L). These were not graded but were to help ascertain the base knowledge of the teachers before the inservice syllabus was constructed.

Remaining inservice sessions were held for all participating teachers in the district on Monday afternoons for five weeks. A final session was held after three months of classroom instruction had occurred.

Major topics of the inservice training were: (1) dietary guidelines and food groups; (2) energy nutrients - protein, carbohydrate, and fats; (3) vitamins and minerals; (4) food processing, additives, and preservatives; (5) sharing and evaluation. Each of the sessions integrated principles of nutrition with use of the curriculum (Appendix M).

The final inservice session was for sharing. Teachers were divided into groups according to grade taught. Materials and other augmentation ideas that had been used were discussed. These groups were all recorded on audio tape. At the beginning of this session, a posttest for nutrition knowledge based on inservice content was administered (Appendix H). The teachers' scores were correlated with the respective classroom mean scores. It should be noted that this session was held at the end of the third month of classroom instruction and three months after the last session of the actual process of instruction to the teachers had been completed.

Curriculum

The nutrition education curriculum used in this project was one developed by nutritionists and curriculum specialists at the California State Department of Education, Bureau of Child Nutrition Services. The curriculum was compiled from a selection of lessons developed between 1976 and 1978 by nutritionists in 16 school districts in California. Each of these individual projects had been evaluated and validated. The evaluation of the curriculum as a whole has shown it to be effective for the teaching of food and nutrition concepts. It suggests, but does not contain, a parent education component.

There are five concept areas within the curriculum based on those

suggested by the 1969 White House Conference on Food, Nutrition and Health. The California curriculum guide has divided the concepts under the topics of: (1) food choices, (2) factors influencing food choices, (3) food-related careers, (4) consumer competencies, and (5) food handling. The concepts also meet those suggested by the American Dietetic Association for Child Nutrition Programs (American Dietetic Association, 1974, pp. 520-521).

Classroom Instruction

Classroom instruction of students was done by the respective classroom teacher. The curriculum provided for many activities in which students did independent work, such as recording what they ate, charting their height and weight as a function of growth, growing plants, and preparing foods for consumption. A member of the project staff was available to assist teachers in both treatment schools.

Measurement of Attention by Teachers

Teachers in both test schools were requested at the outset of the program to include nutrition education in their classrooms at least 60 minutes per week for the entire test time of approximately four months. During that time, each teacher was contacted at least once a week by a staff nutritionist. A short questionnaire indicated what lesson had been used, length of time of the lesson(s), pupil enthusiasm, difficulty of the lesson, adequacy of the curriculum, and helpfulness of the inservice in instructing the lesson.

Student Testing

Students in grades two and three were pretested and posttested for

both cognitive and affective scores. These tests were given to the entire class at one time. The prepared directions were read by the individual teachers, who read each item to the class twice. Students put an "X" in the box with the correct answer.

Cognitive testing was done in kindergarten and first grade classrooms. Testers were trained by the project director so that conditions of testing remained constant at all schools. The kindergarten children were tested individually. Large picture cards were used and questions asked verbally by the tester, who recorded the child's response on a coded answer sheet.

First grade children were tested in groups of eight to ten. The questions were read to the group by the tester while two other persons, either another teacher, student teacher, or another tester, circulated among the group of children to insure that they were on the appropriate test item. The child placed a large "X" on the picture with the "correct" answer as the questions were read. Each question was read twice.

Plate Waste-Study

Plate-waste studies were done at all three schools for two successive days in both the pretest and posttest periods. Identical menus were served at all schools. The same foods were served in both test phases, which were held the same two days of the week in both phases.

Five trays at each school were randomly selected prior to serving and the total gram weight of each food item recorded. All scales were calibrated before the test began. An average weight of each of the food items per school was calculated to be used as a standard of comparison among the schools.

Weighing was done in an unobtrusive manner out of view of students and cooks. Each test period included one windy and partially rainy day. Temperatures at both times of the year, late October and early May, were around 70^o F., and all days included some recess time.

Since many students bring lunches from home, not all the students in the study had plate-waste data. Also, many of the students who ate the school lunch in the pretest phase did not participate in the post-test phase, and vice versa. This limited the sample size extensively in this particular measurement. Additionally, the participation of kindergarten children in the school lunch was extremely low. Although USDA mandates that a hot lunch be available to all kindergarten children, due to the hours at which the classes are held participation is extremely limited. It is believed by district officials that the majority of the kindergarten children eating school lunch is in the "free-lunch" category; i.e., receiving lunch at reduced or no cost based on the low level of family income. This is a logical explanation for the low participation at both the treatment and control schools in the study.

In order to gain cooperation for recording of plate-waste data, teachers were informed of the plate-waste study. The name of each child in each classroom in the study was put on the adhesive nametag by the teacher. The children put the nametags on their shirts while in the classroom and were instructed to remove them and place them on their milk cartons as soon as they sat down to eat. Cafeteria supervisory personnel (not cooks) circulated to see that this was done. Children who brought "bag" lunches from home also received a tag and put it on their milk carton, or bag if they did not get milk, to avoid the "Hawthorne effect." All children left trays, bags, and milk cartons on the

tables. Trays were collected after the children had left the lunchroom.

Parent Education

The objectives for parent education were as follows:

1. To create an awareness of good nutrition and its benefits to the individual family;
2. To provide information which would assist parents in providing a healthful selection of foods for their family;
3. To provide parents with practical information for the incorporation of nutritious foods for meals and snacks (e.g., recipes, shopping information);
4. To encourage parents to involve their children in food selection and preparation;
5. To assist the families with any special dietary problems or concerns;
6. To provide feedback on the nutritional value of the meals being consumed by the child.

Parents of the students in the SPI school were contacted at least biweekly through newsletters, workshops, and telephone calls. The parents were encouraged to participate in both classroom and lunchroom activities. An initial questionnaire survey (Appendix B) was sent home to all parents with an introductory letter (Appendix A) in order that they could indicate activities preferred. The list included workshops, diet counseling for individuals and families, family menu analysis, participation in classroom activities, and reception of a newsletter. The latter was the most commonly checked item.

Following this, a newsletter every two weeks was the primary vehi-

cle of contact and information. The newsletter contained articles on subjects of interest as ascertained by the questionnaire, recipes on request were given by parents, a question-and-answer column on controversial topics on such things as sugar and food additives. A feature article comprised the major portion of the newsletter. The topics of these articles were determined by the project director as being concepts which were information necessary to good nutrition for consumers and answering a variety of questions commonly unknown and frequently asked by American consumers (Appendix D).

Dietary counseling was requested for ten families from the SPI school. Menu analyses were done by DAYREQ computer analysis program for 12 families. The teachers, parents, and students were not informed of the study being conducted. The teachers at the SI (student involvement only) school were requested not to involve the parents in the program at all. It was necessary to do this early in the program to insure that contamination would not occur. The teachers were requested to keep the study information in professional confidence.

At the end of the test period, all parents of children in the three test schools were sent a letter enlisting their cooperation and informing them that a food-record questionnaire would be arriving in the mail within a week. The parents of the children at the control school were sent a separate letter informing them that this information would be used in requesting refunding of the entire project for the school district and including them as a target school (Appendices E and F).

Within a week, a parent-consent form and a food-frequency recording form, together with a stamped, self-addressed envelope, was sent to all the parents (Appendices G and C). Both forms, as well as the treatment

procedures, had been approved by the Human Subjects in Research Committee at both Utah State University and California State University, Chico. In addition, the food-frequency form had been pilot tested on a small sample of similar parents.

It was requested that all forms be returned within two weeks. At the end of this time, a reminder was sent home from school with all the children at all three schools who were participating in the study. Due to a smaller number of respondents from the control school, phone calls were made at the end of the two-week period to encourage more returns.

When an adequate sample of responses from each school had been returned (i.e., 50), phone calls were made to every fifth parent from the respondent group in order to obtain a second day's record, which would allow calculation of the stability of the instrument. Phone calls were then made to nonrespondents from all schools to determine if a difference might exist between these parents and those who had responded to the request for the food record.

At the conclusion of the classroom instruction, posttests of cognitive learning, measurements of attitudes, and plate waste-studies were administered at both the test schools and the control school. All data were keypunched at the computer center at CSU, Chico, for subsequent analyses by SPSS program.

Family menus which were received for analysis were done at CSU, Chico, on the DAYREQ program and returned to the families with an explanation of nutritional adequacy of the menu. Individual food records were analyzed for food quality and diversity scores and, in addition, the number of each of the following which the child would consume: milk and milk products, fruits, vegetables, cereals, soups, and meat/

poultry/fish items. The mean scores per school for each of the preceding were determined. In addition, the individual child's scores in quality and diversity were correlated with the respective posttest cognitive scores.

Analyses

Results of cognitive and affective tests, as well as plate-waste measures, were keypunched at California State University, Chico. Cognitive and affective tests were analyzed with analysis of covariance using the pretest scores as the covariate. Plate-waste data were analyzed for each school using analysis of variance. All measures were used to determine the main effect of school at three levels: parent involvement (SPI), no parent involvement (SI), and control.

Food records which were returned from the parents were scored for dietary quality, food diversity, and total foods within six groups. Analysis of variance, again using the school as the independent variable, was performed for eight different scores, with dietary quality and diversity of major interest.

CHAPTER IV

RESULTS

Introduction

Data from all tests and questionnaires were analyzed by methods appropriate to the respective purpose of the instrument. Each hypothesis was tested at the .05 level of significance. The findings of each specific instrument are reported separately. A discussion of these results appears in the final chapter.

Findings

Food Records

Analysis of variance was performed on food-record data received from the parents of students at all three schools who were involved in the project. The null hypothesis being tested was that the dietary quality and food diversity of the children at all three schools would be the same. The results indicate that in the homes in which parents were receiving nutrition education information, the children had a significantly higher dietary quality and diversity score than the children in the other two schools. Further, the children in the school who were receiving nutrition education without concomitant parent involvement had significantly higher quality and diversity scores than the children in the control school. The difference between the groups was determined by the Newman-Kuells method of multiple-comparison analysis. Results are summarized in Table 2.

Table 3
Mean Differences for Diet Record Items
by School

Category	School		
	SPI N=51	SI N=50	Control N=50
Dietary Quality (1-6)#	5.35 ^a	4.71 ^b	4.24 ^c
Food Diversity (1-20)	12.29 ^a	11.08 ^b	10.18 ^c
Meats/Poultry/Fish (1-6)	3.14	2.47	2.58
Fruits (1-7)	3.02	2.89	2.66
Juices (1-5)	2.02	1.76	1.62
Vegetables (1-7)	3.57 ^d	3.08 ^d	2.46 ^e
Milk/Milk Products (1-5)	2.55	2.31	2.24
Cereals (1-5)	2.26	2.36	2.22

= Range.

Means having different superscripts are different $P \leq .05$.

Analyses of food eaten by food group showed a significant difference in the number of vegetables eaten in the home where nutrition education was being received by the parents (SPI) and the control school. There was no difference, however, between either treatment group (SPI and SI), nor was there a significant difference between the SI group and the control group.

In addition to the vegetable group, other food groups scored for number of foods within which the child usually ate at home were the following: (1) milk and milk products; (2) juices; (3) soups; (4) fruits;

(5) cereals; and (6) meat, poultry and fish. There was no significant difference between the treatment groups, or treatment and control groups, for any of these foods which the child was eating at home.

Cognitive Scores

Analysis of variance was performed on the pretests for all grade levels at all three schools (Appendix R). There were no significant differences in the pretest scores, which are summarized in Table 4.

Table 4
Pretest Cognitive Scores by School by Grade
Means and Standard Deviations

Grade	SPI	School	
		SI	Control
Kindergarten N=109	12.04±2.8 ^a N=28	12.25±2.3 N=53	12.57±1.6 N=28
Grade One N=74	14.50±2.5 N=36	12.24±2.7 N=21	14.30±2.4 N=17
Grade Two N=87	15.88±2.3 N=40	15.06±1.4 N=18	15.97±2.6 N=29
Grade Three N=125	16.91±2.3 N=59	17.5±1.8 N=42	16.04±1.7 N=24

^a = Mean±standard deviation.

In order to remove the concomitant variance between the pretest and the posttest and thereby enhance the treatment effects, analysis of covariance, using the pretest scores as the covariate, was performed on cognitive scores for all three schools at all four grade levels. Because two different sets of test questions were used, kindergarten

scores were calculated in one analysis (Table 5) and grades one to three were calculated in another (Table 6). The results of these analyses showed a significant covariate (pretest) effect in both determinations. A significant main effect of differences in schools was also present in both analyses (Appendices S and T).

Kindergarten scores. A multiple-classification analysis of kindergarten scores was performed in order to make adjustments in the mean for the effect of the covariate. The data in Table 5 provide both the unadjusted means and the adjustments for deviations by school. The means of both schools which implemented the nutrition education were similar in quantity, but a post-hoc multiple-comparison test (Scheffé) identified the locus of the difference as being between the SPI school and the control school classes. There was no significant difference between the means of the SI school and the control school, nor were the means between the SI and SPI schools significantly different.

Table 5
Results of Kindergarten Cognitive Posttests

School (N)	Unadjusted Mean	Deviation from Grand Mean	Adjusted Mean
SPI (23)	17.78	0.76	17.82 ^a
SI (43)	17.26	0.20	17.26 ^{ab}
Control (24)	16.08	-1.08	15.98 ^b

Grand mean = 17.06.

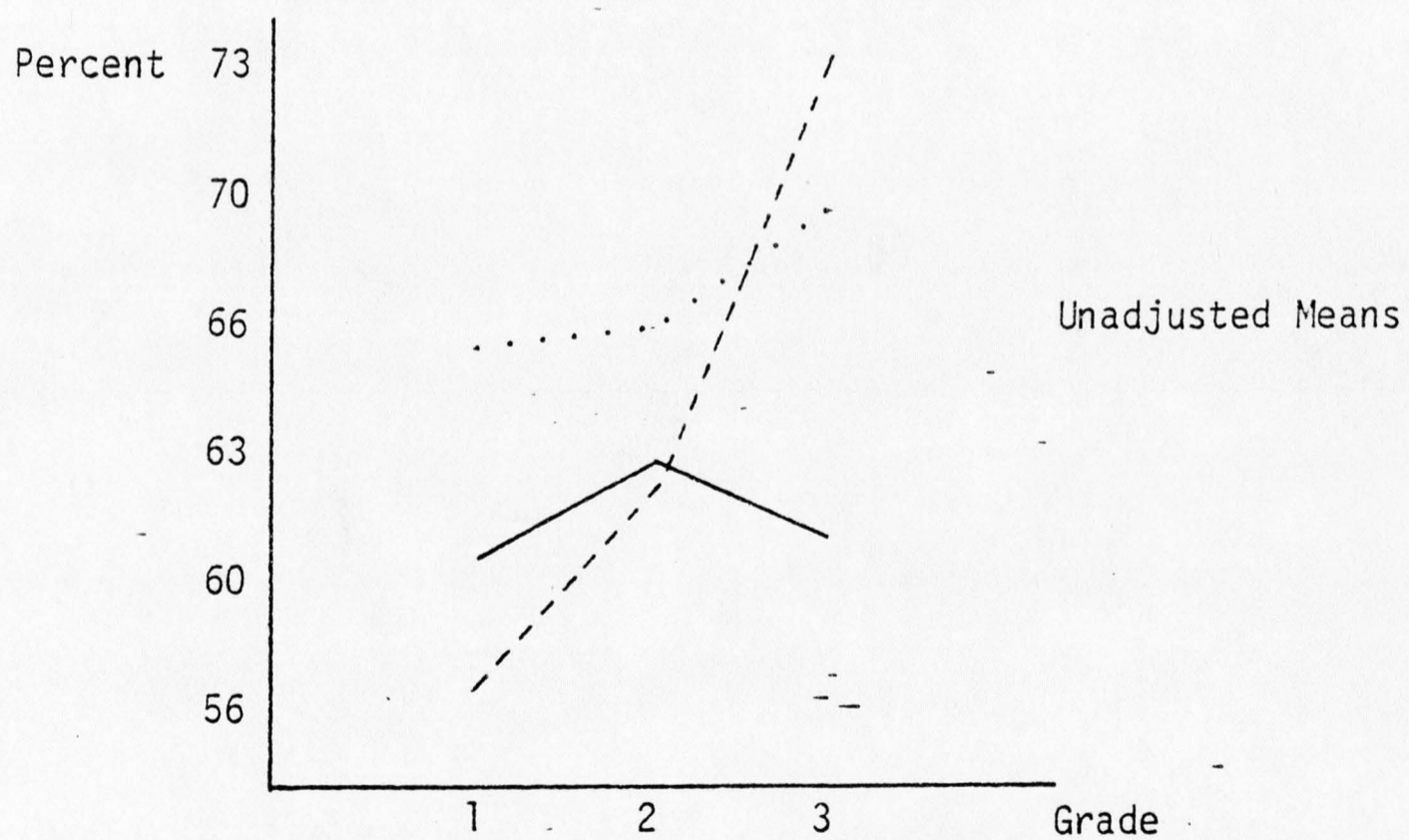
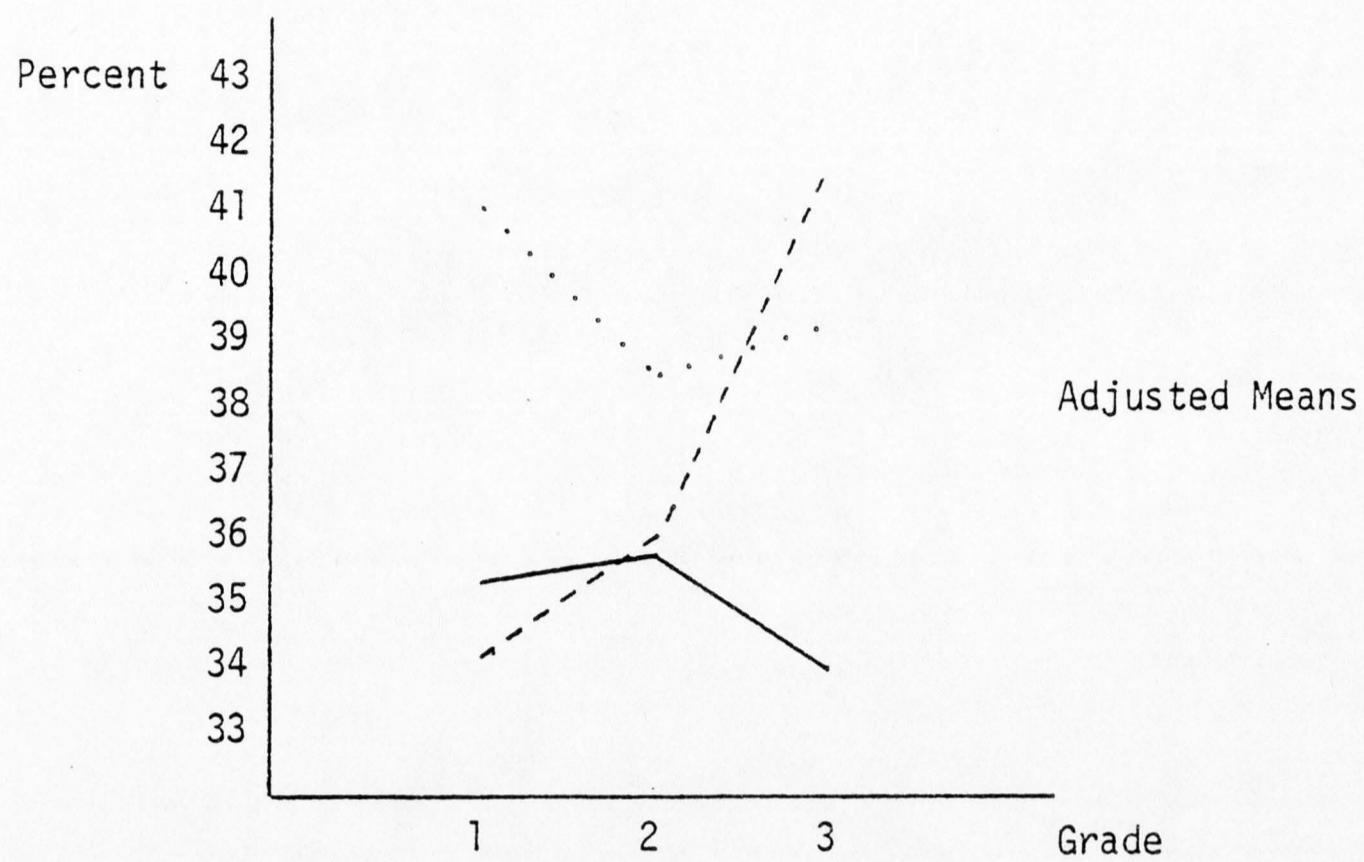
Multiple R = .369.

Grades one-through-three scores. Analysis of covariance was also performed on the data from these subgroups. This determination showed a significant covariate effect, a significant main effect between schools, and a significant interaction effect (Appendix T).

Because of the significant interaction, a standard multiple-classification analysis to remove variance per grade per school could not be performed. In lieu of this, beta weights for all variables were obtained by regression analysis. Deviation scores were then computed by multiplying the covariate beta weight coefficient (0.4107) times each student's precognitive score, and then subtracting the quantity obtained from the individual's postcognitive score. This calculation removed the effect of the linear relationship between the two variables (pretests and posttests). Resulting mean deviation scores for each grade and school were then calculated, and a standard analysis of variance performed to identify differences from the treatment.

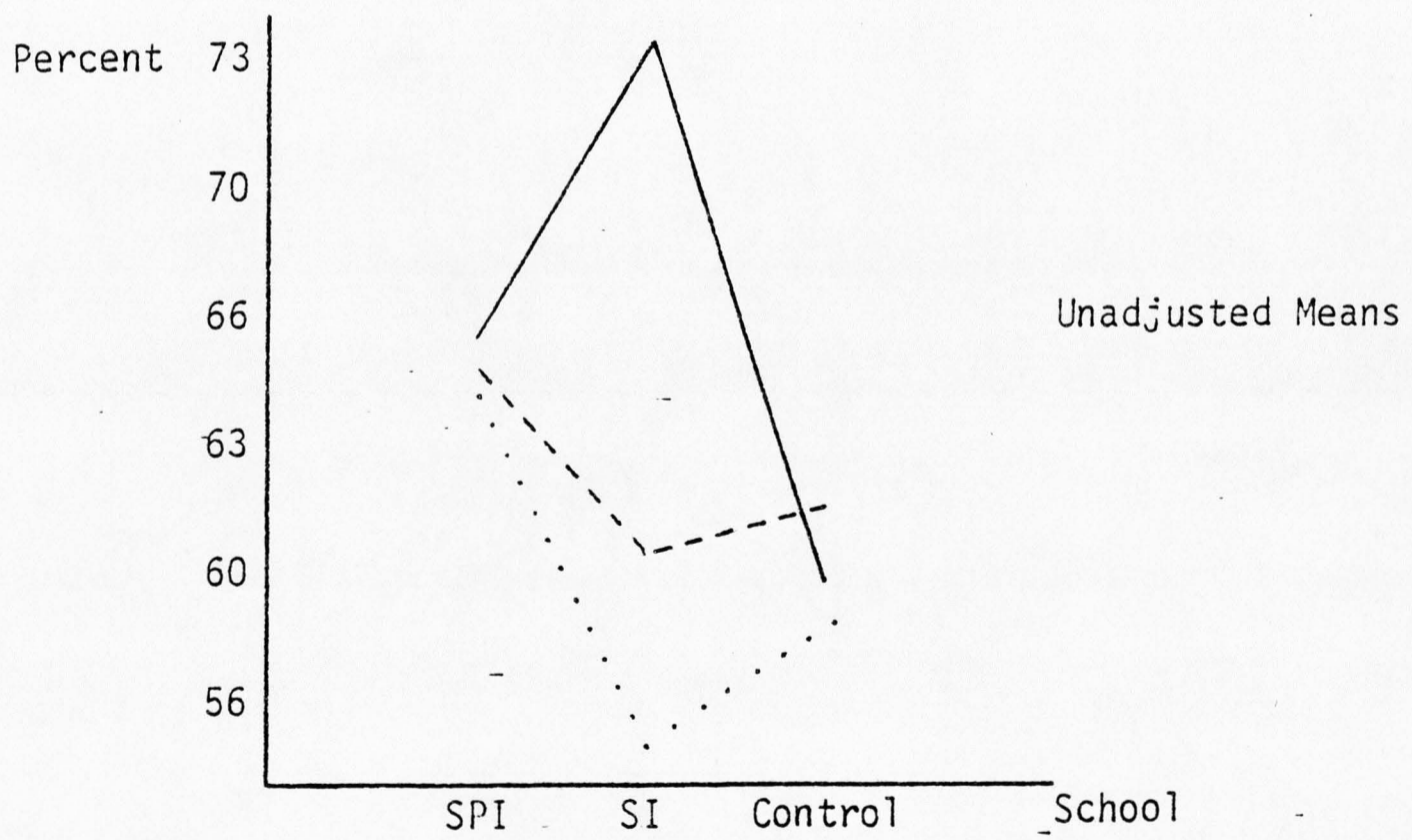
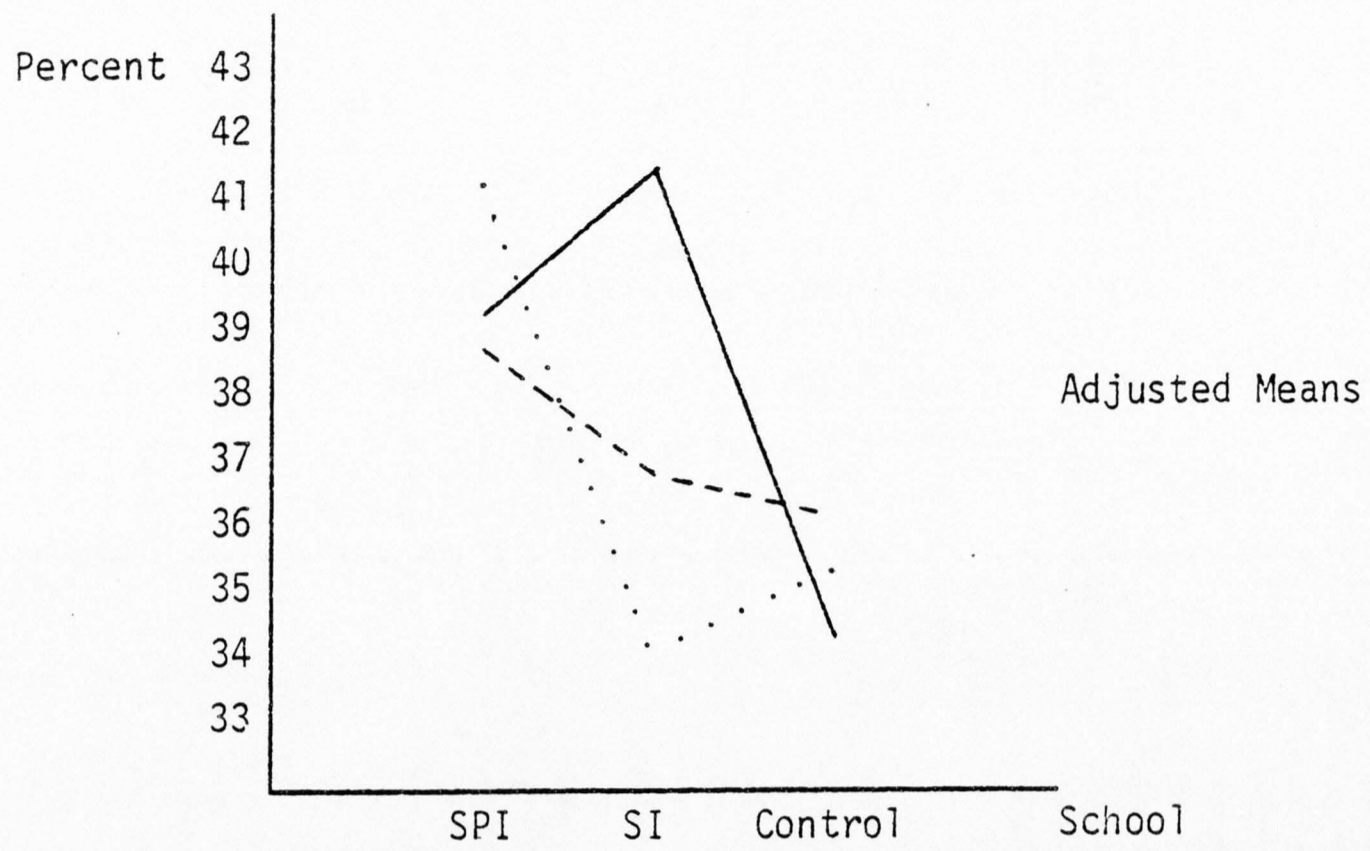
The data in Table 6, analysis by schools, shows a significant difference between groups. A multiple-comparison test (Scheffé) identified a significant difference to exist between the SPI and the control school and also between the SI school and the control. No significant difference is present, however, between the means for the two treatment schools.

Mean deviation scores, expressed in percents remaining after the covariate portion of the variance has been removed, are plotted in Figures 1 and 2. For contrast purposes, the unadjusted means for grade and school are also plotted. It is interesting to note the enhancement of treatment effects at various levels when the variance due to the correlation of the instruments is removed.



Legend: SPI
 SI -----
 Control —————

Figure 1. Cognitive test postscores by grade.



Legend: Grade 1
Grade 2 - - - - -
Grade 3 _____

Figure 2. Cognitive test postscores by school.

Table 6

Adjusted Deviation Mean Percent Scores[±]Standard Deviations
for Cognitive Posttest by School by Grade

Grade	School		
	SPI (N)	SI (N)	Control (N)
One (76)	41.2 [±] 8.2 ^a (39)	34.5 [±] 12.9 ^b (23)	35.6 [±] 11.0 ^b (14)
Two (82)	38.5 [±] 11.6 (39)	36.4 [±] 4.2 (19)	36.0 [±] 9.6 (24)
Three (104)	39.2 [±] 8.2 ^a (46)	41.5 [±] 14.1 ^a (37)	34.0 [±] 7.14 ^b (21)
Overall (262)	39.6 [±] 9.4 ^a (124)	38.2 [±] 13.2 ^a (79)	35.2 [±] 9.1 ^b (59)

Means having different superscripts are significantly different $P < .05$.

Although the means by grade are similar (percent range = 34-39), individual grade level means at the three schools show considerable variation and interaction of grade and school. The third grade class in the SI school (no parent involvement) obtained a mean deviation score of 41.5 percent, which may account for the lack of significant difference between the SPI and SI schools. A t -test between first grade mean deviation scores showed a significantly higher mean for this class at the SPI school than at the other two schools.

Affective Tests

Grades two and three were the only levels to be tested for this measure. Pretest results are summarized in Table 7; analysis of variance for these scores showed no significant difference between the

groups (Appendix V). Following the posttest, analysis of covariance was applied to the affective scores to remove the concomitant variance between the pretests and posttests, thereby enhancing the treatment effects.

Table 7
Affective Pretest Scores
by School by Grade

Grade	School		
	SPI N=101	SI N=50	Control N=53
2	5.27±1.5 ^a (41)	5.8±1.5 (18)	4.6±1.4 (29)
3	4.7±1.1 (60)	4.7±1.3 (42)	5.0±1.2 (24)

^a = Mean±standard deviation.

Results of this analysis showed a significant covariate effect as well as a significant main effect between schools (Appendix W). There was no significant effect between grades, nor was there any interaction effect for this test. A multiple-classification analysis was then performed to obtain deviations from the means which were due to the covariate effect (Table 8). A multiple-comparison analysis (Scheffé) was then performed to determine the location of the significant difference between the means per school. Significant differences were found to exist between the treatment schools and the control school. There was no significant difference, however, between the adjusted means scores for the parent-involved school and that with student involvement only (SPI vs.

SI school).

Table 8
Results of Affective Posttests
Adjusted Mean Scores

Grade	School			Deviation
	SPI N=83	SI N=51	Control N=34	
Two N=69	13.85 ^a N=38	14.35 ^a N=17	12.86 ^b N=14	.34
Three N=99	13.27 ^a N=45	13.77 ^a N=34	12.28 ^b N=20	-.24
Deviation	.05	.55	-.94	

Grand mean = 13.46.

Multiple R = .307.

Means with different superscripts are significantly different $P < .05$.

Plate-Waste Study

Data from all subjects who participated in the school lunch program on one day in the pretest period and one day in the posttest period were used for the analyses. If a subject ate on both days in both phases, an average figure for the two days was used. Because many students participated in either the prephase or the postphase, or vice versa, but not both phases, the number in the sample for the analyses of this measure was reduced to 100. If calculations were based on students who ate both days of both phases, the number of the sample would have been reduced to 29. All calculations were, in fact, made for the sample of 29, and no significant differences for total plate-waste decreases or individual

food-item decreases were identified using a t -test. Analysis of variance for food-item decreases to determine if any differences between schools existed also resulted in non-significance. Hence, it was decided to use the larger size sample ($N=100$) to determine if any significant differences could thereby be identified.

Correlations. Pearson product movement correlations between cognitive and affective scores, respectively, and increases or decreases in plate waste by individual food item were calculated. The data obtained in the two treatment schools are summarized in Table 9. Results of the correlations show a significant relationship between decrease in plate waste for fruit and the posttest affective score of the student. However, it should be noted that this is but one significant correlation in a total of 28 and may be thought to have occurred at random.

Table 9

Correlation of Posttest Scores with Changes Between
Preplate and Postplate Waste Analyses

	<u>Changes in Food Item (\pm)</u>					
	Meat	Vegetables	Salad	Bread	Fruit	Milk
Cognitive Post Score ($N=78$)	.01 ^a	.05	-.00	.06	-.09	-.04
Affective Post Score ($N=56$)	.09	-.02	-.05	.07	-.23*	-.01

^a = Correlation coefficient.

* $P < .05$.

Food decreases. The six food items of a school lunch were used for the determinations: meat, vegetables, fruit, salad, bread, and milk. Means and standard deviations were calculated at each grade level at each school for each individual item, plus total waste, in both the pre-phase and postphase. A change score for each item at each school was then determined. All measurements are in grams.

Results of the prephase analyses show no significant differences present for any of the comparisons. The identical analyses were done for results of the posttest phase. The formula used to determine the change score was prewaste minus postwaste, the remainder then being divided by the prewaste. Changes in means per item per school are summarized in Table 10. There were no significant decreases for any grade at any school for any food items except fruit and milk, for which the control school showed a significant decrease in the former and increase in waste of the latter.

Table 10

Changes (\pm) in Food Items by School Between Preplate and Postplate Waste Analyses

School	<u>Food Item Mean Weight (gm)</u>					
	Meat	Vegetables	Salad	Bread	Fruit	Milk
SPI N=45	2.61	-1.167	-.633	-1.88	5.19	12.36
SI N=33	-5.49	5.72	1.61	-13.15	6.85	-15.45
Control (22)	-4.96	-12.19	1.96	-6.02	-2.55*	11.72*

*P<.05.

In the overall (total) postphase plate waste, there was significantly less plate waste at the school without parent involvement (SI) than the control school, and significantly less plate waste at the control school than at the SPI school (Table 10). Changes in total plate waste per grade per school are summarized in Table 11.

Table 11

Total Grams of Plate Waste in Posttest Phase by School by Grade
(Mean±Standard Deviation)

Grade	School		
	SPI	SI	Control
K	212±0	56±59	--
1	120.8±91.9	35.1±31.6	108.4±62.6
2	154.1±123.3	53.2±50.2	100.4±70.5
3	127.3±96.1	71.4±85.2	89.8±78.1
School Mean	137.3±104.1 N=45	57.5±66.1 N=15	96.9±70.1 N=22

Interitem Correlations

An interitem correlation matrix was computed for each student's scores in dietary quality, food diversity, precognitive score, and post-cognitive score, as well as the teacher's posttest score. There were no significant correlations in the matrix. A correlation between teachers' posttest scores and their respective classroom mean cognitive scores showed no significances.

Table 12
 Changes (\pm) in Grams of Total Plate Waste
 by School by Grade

Grade	SPI	School	
		SI	Control
K	-59.0	9.4 \pm 106.7	--
1	.11 \pm 91.7	-71.3 \pm 75.2	4.8 \pm 69.5
2	13.6 \pm 163.5	53.2 \pm 50.2	-20.3 \pm 103.7
3	37.7 \pm 103.1	-26.7 \pm 127.0	-15.1 \pm 108.4
School Mean	19.5 \pm 124.0 N=45	-19.9 \pm 108.1 N=33	-12.0 \pm 95.7 N=22

Attention to Treatment

From interviews with teachers at both treatment schools each week, attention to use of the curriculum was determined from a form filled out by the visiting nutritionist. In both treatment schools, all teachers consistently used the curriculum for an average of 50 minutes per week during the treatment period. Nutrition was more frequently than not incorporated into another subject area (e.g., math, art, social studies), as this is the way most of the curriculum is organized. The inservice was reported to be helpful in teaching the lessons. Pupil enthusiasm was consistently rated as high for lessons taught, and the difficulty of the lessons rated fairly easy (two on a scale of four). The curriculum guide and materials were felt to have occasional gaps in completeness for teaching the lessons. A sample questionnaire and average response is seen in Appendix I.

CHAPTER V

DISCUSSION OF RESULTS

Summary of Major Findings

Analyses of the data from this study lead to the rejection of the primary null hypothesis; i.e., that parent involvement in a nutrition education program will not result in better food habits by their children. Statistical analyses of the food records received from the parents indicate that children attending the school where both parents and children were receiving nutrition information (SPI) had higher dietary quality scores and were eating a wider variety of foods at the conclusion of the treatment period. The scores were significantly higher than those of the children at both the school where children were receiving nutrition education in the classroom (SI) and those of children at the control school. In addition, it was found that the children at both schools where nutrition education was implemented had higher scores for vegetable consumption than children at the control school. While this was not an objective of the study it was an interesting finding, indicating some effectiveness of nutrition education in the classroom of food-related behavior of the child in the home.

While students in kindergarten and first grade at the SPI school had higher cognitive scores than children at the SI or control schools, this finding was not present at grades two and three and, therefore, cannot lead to a general conclusion that parent involvement will be likely to result in better learning of nutrition principles by their

children. The cognitive scores of the children at the SPI and SI schools were significantly higher than those of the control school children, indicating the effectiveness of the curriculum in improvement of nutrition knowledge.

Affective posttest scores for children at the SPI and SI schools were significantly higher than those of the control school students. This finding also implicates the effectiveness of the curriculum in developing positive attitudes concerning nutrition. The scores of the students at the SPI school were not significantly higher than those of the students at the SI school in this domain. Thus, the conclusion that parent involvement will result in higher affective scores by their children cannot be made as a result of this study.

The remaining data from the study, as determined from the analyses, support the remaining null hypotheses. There was no significant difference in plate-waste data among any of the three schools at the end of the treatment period. The small correlation between fruit intake increase and affective score of the student leaves some doubt concerning chance occurrence when compared to the entire table of these results. Also, the decrease in milk consumption by the control school children in the posttest phase is questionable in view of the entire data from this aspect of the study. In addition, there was no significant correlation in teachers' posttest scores and their respective classroom mean cognitive postscores.

Discussion and Implications

Inservice

The importance of teacher inservice in a nutritional education pro-

gram for children has been repeatedly recommended (White House Conference, 1969; Grogan, 1978; Petersen & Kies, 1972). The majority of teachers, like most of the general population, has had virtually no formal and reliable education in this discipline, which is necessary to proper implementation of a nutrition education curriculum (Carver & Lewis, 1979). Cook et al. (1977), in a multiple probit and regression analysis, showed that the number of hours of preservice/in-service education in foods and nutrition courses was significantly related to not only the decision to teach nutrition, but the number of hours it was taught in the classroom. The results of the teacher's self-assessment of nutrition knowledge (Appendix N) verified this weakness in teacher education.

The inservice used in this study was based on concepts from the self-assessment and focused strongly upon the integration of nutrition knowledge in the teacher's own life (Appendix M). By promoting a strong positive value of the discipline, the teachers were thereby encouraged to use the nutrition education curriculum with confidence. Although the attitude of the teachers concerning nutrition was not pretested or post-tested, primarily due to a lack of appropriate instrument, Grotowski & Sims (1978) have shown a high positive correlation between teacher knowledge and attitude. It is believed by this researcher that the success of this project in the treatment schools is largely due to a well planned and executed inservice training for the teachers involved.

Curriculum

The lessons in the curriculum guide used in this project were appropriate for grade level and were both sequential and easily integrated

into existing curriculum, as had been previously recommended (U.S. White House, 1969; Petersen & Kies, 1972; Ulrich, 1979). Nutrition is integrated into one's daily life; thus, integrating it with other disciplines not only is a natural progression of the use of the knowledge, but does not restrict use of the curriculum by requiring a separate block of time for instruction of nutrition facts. This is in contrast to what is practiced by the Dairy Council of California program (Fisk, 1979).

The curriculum stresses both cognitive and affective learning, as has been recommended (Carver & Lewis, 1977; Bell & Lamb, 1976). The overall goal of the program is that good eating habits be established for life, which is ultimately the goal of nutrition education programs (Ulrich, 1979). Children learn about nutrition by learning about food (Maretzki, 1979), and many of the lessons for the primary children are those of "hands-on" experiences with foods.

The lessons which are included in the curriculum are taken from model project curricula which had been previously developed in California (Wolff, 1979). A prototype of the curriculum used in this study was drafted and field tested in 1978. Instruments which were developed to test the first draft yielded very high reliability coefficients (Wolff, 1979). However, the curriculum was revised as proficiencies were refined, requiring instrument revision also. Thus, the instruments used in the pretest phase were being tested for the first time and, consequently, required refinement for the posttesting.

Eating Behavior in the Home

The results of this study indicate that eating behavior in the home

is improved if the parents as well as the children are receiving nutrition education. While a parent-education component has been advocated since the concept of nutrition education in elementary schools was initially proposed (U.S. White House, 1969), reports of attempts are minimal (Smith & Justice, 1979) and effects specifically undetermined. Even so, the component is continuously recognized as a contributing component to the actualization of nutrition knowledge and attitude gained in a school setting (Yperman and Vermeesch, 1979; Caliendo & Sanjur, 1978; National Nutrition Consortium, 1980).

While the records received from the home were representative of only one day's intake, the validity of one-day recalls has been documented. In addition, a telephone interview of 20 percent of the respondents resulted in a high correlation between the two scores. Further, the second day's information was received in a different manner than the questionnaire. In the telephone interview, the parent was asked to list the foods that the child had consumed during the previous 24 hours. As this was recited, it was noted by the nutritionist placing the call and then tallied by this latter person rather than the parent.

Several articles in the literature deal with the subject of the validity of dietary recall (Gersovitz et al., 1978; Adelson, 1960; Young et al., 1952; Madden et al., 1976). In order for a 24-hour recall to be perfectly valid, all food would have to be weighed and then compared to the subject's report. This is usually, if not always, impossible outside institutional settings. Twenty-four-hour recalls for group means are acceptable, particularly when an intense nutrient analysis is not being done. Young et al. (1952) in particular reports on the acceptability of group means for this instrument for groups of elementary

school children's diets.

Questionnaires. Every assurance was made that the parents would respond to the food-frequency form. The advance letters were sent a week ahead of the survey form by first class mail, and importance of the reply was strongly stated. The form was accompanied by a return, self-addressed, stamped envelope with prepaid postage. The form itself was limited to one page for the convenience of the respondent.

The legal requirement of signing a consent form may have introduced some bias, however. Anonymity and privacy may be considered of such high value to some people as to deter their participation in revealing a personal health habit such as eating behavior. For this reason, telephone calls were made to ten nonrespondents from each school. All these contacts reported their reason for nonresponse as their being "too busy," or "misplacing" or "overlooking" the form. The largest percentage of nonrespondents was from the control school. Parents of children at the SI school (student involvement only) made comments indicating some awareness that the children had been learning about nutrition at school. The nonrespondents from the SPI school were very verbal about the program and expressed appreciation. In sum, there was a most obvious difference in the groups.

The parents of the children at the SPI school were the most receptive and responsive to the questionnaire. The highest percentage of response came from this sample subgroup, and the forms were returned very quickly. In the "comment" section of the form, most of the parents wrote one or more positive statements concerning nutrition and/or the project. The responses from the parents at the SI school were returned at a rate almost equal to that of the SPI school, but the number of com-

ments was considerably less in quantity (SPI = 34 and SI = 12 comments) and quality. There were virtually no comments from the parents at the control school, who were told that they were being surveyed as it was anticipated that the project would be funded for their school the next year. This was done as a motivational factor.

It was decided at the outset not to obtain data from the homes prior to the implementation of the program. The reason for this decision was to avoid pretest sensitization to the fact that home eating habits of the children would be evaluated at the end of the program. Likewise, neither teachers nor administrators were aware of what method of data collection would be used, although the staff at the SI school was requested initially and periodically to limit information to the classroom. The fact that the children may have discussed their learning experiences about nutrition at home was beyond the control of the researcher. Brown (1977) has reported that some casual information is carried home by the children or other students, which shows that children tend to discuss what happens at school with their parents.

Dietary quality and food diversity. The quality of the diet was scored on a scale of one to six, reflecting adequate servings of the basic four food groups, plus one point for a vitamin C-rich food and one point for a vitamin A-rich food. The diversity score was based on the total number of different foods marked by the parents. Since the theory behind using the diversity score is that variety is the key to a nutritious diet, it was decided not to count "junk" food items listed. Junk foods are defined in this study to mean any food which has: (1) 25 percent or more added sugar, and/or (2) 40 percent or more added fat, and/or (3) less than five percent of one of the eight major nutrients (i.e.,

protein, vitamins A and D, thiamin, riboflavin, niacin, calcium, or iron). This definition and the criteria are used in California school districts to determine if a food or food product may be sold on secondary school campuses (all are prohibited from being sold in elementary schools).

Food groupings. The questionnaire also requested parents to list food in six groups which the child would eat when it was served to him/her. The groups were: (1) milk and milk products; (2) fruits; (3) vegetables; (4) meat, poultry, fish; (5) cereals; and (6) soups. Although the total diversity of the diet was significantly different for the children at each school, this was not reflected in these itemized food groupings. It is of interest, however, that the children at the SPI school had longer lists of acceptable vegetables than those at the control school. This suggests that the awareness of nutrition in the home may have influence on what is offered to the child.

Instruments

Pretests were found to have lower reliability coefficients than would be desirable. The tests were also found to be easier than was desirable, especially for second and third graders, which introduced a "ceiling effect" into the data. These findings were true of the statewide as well as the project sample. Sampling and content validity, as well as construct validity in the affective tests, needed improvement. Thus, in the period between the pretesting and posttesting, this researcher met with a research evaluator to identify strengths and weaknesses of the tests through cross tabulation analyses and scrutinizing of validity factors. Meetings were then held with the Bureau of Child

Nutrition curriculum specialist to revise the cognitive tests. Finally, the latter two persons met with two specialists in affective testing, plus five elementary school teachers with a great deal of experience and expertise, and three other nutritionists. The affective tests for elementary school levels were subsequently revised.

Cognitive tests. Construction of a valid and reliable test which would accurately measure the nutrition knowledge which the child had retained was the major goal in developing this instrument. Test conditions were constant in all three schools for each grade level. The significant difference between schools in the analyses indicates that the effects of nutrition education at both the treatment schools, whether or not parent education was concomitant, were similar; i.e., the learning was comparable at both schools.

A significant result in the cognitive scores between the treatment school groups may have been present if the third grade class mean at the SI school had not been extremely high. After analyzing the results, the principal of the SI school was contacted to see if perhaps this result may have an explanation. It was learned that the class had indeed been an exceptional group. At the end of the third grade year, this particular group scored an average of two years ahead of grade level on achievement tests administered to all third graders in the district. The exceptional status of the group was not known ahead of time and was beyond the control of the researcher. It does, however, seem to be a plausible explanation of the extreme statistic and lack of significant difference between the two treatment schools.

Parent involvement may intensify the interest of lower primary grade children; i.e., kindergarten and first grade students. This in-

volvement may result in better retention of cognitive information and consequent higher scoring in the posttest phase of a nutrition education program. Children of this age are still spending a great deal of time interacting with their parents. Peer pressure is not as dominant in their lives as it is with children beyond age seven. A larger sample of classrooms, a sample without a class with such extremely high achievement scores, and a more reliable instrument may have identified a statistically significant difference between the groups with and without parent involvement at all primary grade levels.

The reliability of the cognitive posttests remained the same as that of the pretest for the kindergarten testing (.66), was marginally improved for first and third grades, and strongly improved for second grade. Combining the coefficients for the three grades and averaging would improve the reliability measurement for the group. In any case, the instruments are still in a crude stage for use in prediction. A further complication is the fact that testing situations are unfamiliar to kindergarten and first grade students as compared to older children, and the development of a good instrument for these grade levels is most difficult.

Improvement in the reliability coefficient for the second grade is thought to be due to the increase in difficulty by removal of the pictures. The slight increase in the third grade reliability can probably be attributed to the same reason. It is necessary to consider the purpose for which the tests are to be used; i.e., pretesting and posttesting of very large samples in combination with other measurements. For this purpose, the coefficients above .65 are considered acceptable (Borg & Gall, 1971).

Affective tests. Reliability coefficients for the affective tests were improved considerably from those of the pretest phase. A great deal of effort was expended in the construction of these instruments. The measurement of attitudes of primary school children is most difficult, so much so that kindergarten and first grade students were not tested for this domain.

The pretest version contained a total of ten items and was extensively revised for the posttest. Fifteen items for each of the five affective constructs were written by teams of nutritionists and curriculum specialists. The items were then discussed by a large group of nutritionists, elementary teachers, plus two specialists in affective testing from Los Angeles County Schools. The items were then rated and scaled; the 30 highest ranking items were field tested for comprehension and difficulty. The final version contained 20 items which would measure the development of positive attitudes which could be expected to develop through classroom use of the curriculum.

Adjusted means from the posttests show similar means scores for students at the SI and SPI schools. Both schools, however, had significantly higher scores than the control school on this instrument, indicating the effect of the curriculum implementation. The slightly higher mean score for the second grade at the SI school did not prove to be statistically significant.

Food habits and attitudes of children up to age seven tend to reflect those of parents and siblings (Bass et al., 1979). Peer pressure from age seven upward is a significant determinant of attitude formation in regard to foods as well as other areas of the children's lives. These facts may explain the slightly lower mean scores for the attitude

posttests for the third graders at all three schools.

Studies relating attitudes to overt food behavior are almost negligible. The need to study this relationship at all age levels is apparent from the reports of other researchers. Eppright et al. (1969) found a high positive correlation between mothers' nutrition knowledge and nutrition attitudes. Further, a high correlation has been consistently found between a mother's educational level and the nutritional status of the child. The implication here is that involving the parent in a nutrition education program can improve the attitude formation of the child as well as the quality of the diet available in the home.

Plate Waste

The traditional method of measuring behavior change in conjunction with nutrition education programs has been to conduct cafeteria plate-waste studies before and after the implementation of the curriculum. This measurement is limited, however, for two major reasons. First of all, the number of children partaking in the school lunch varies from day to day and from school to school. Yperman and Vermeesch have determined that school lunch participation has "little to do with education" (p. 75). Indeed, the level of the participation often improves simply as a result of the menu being served on a particular day. Secondly, the food choices in the school lunch are not representative of the wide variety and total food choices available to the child in his day-to-day living. Hence, generalization of results is extremely limited, if not impossible.

Plate-waste results from this study were analyzed exhaustively for some indication of a relationship between behavior in terms of school

Lunch consumption and classroom learning. Every conceivable analysis produced a nonsignificant result. Even though every funded project for nutrition education may mandate a plate-waste study, these results indicate that it may be invalid to use this measure as one which measures behavior change related to cognitive learning.

Until fairly recently, plate waste has been a problem in many school district lunchrooms. However, with spiraling costs of both food and labor in the last few years, district food service offices have had to economize as much as any other business operation to keep their program financially "in the black." This is particularly true of the Chico Unified School District, where no local funds subsidize the program.

In order to accomplish a fiscally sound operation, the lunchrooms have begun to cater to the food likes and dislikes of the children. In other words, the foods that are served are foods children like, foods which resemble fast foods, which are easy to eat, and with which most of the children are familiar. However, the variety of food, particularly vegetables, salads, and milk products other than lowfat milk, is very limited. The food served is still highly nutritious, and the serving of high-calorie desserts such as cake and brownies is and has long been discontinued. The result has been higher participation and decreased overall plate waste.

Another tactic which has been used to encourage children to eat is to schedule recess before lunch. In schools in which this change has been made, the decrease in total plate waste has been shown to be effective and statistically significant (Christensen et al., 1979). Introduction of this plan at the control school in the posttest phase without notice to the researcher could very well account for the similarity in

results between the treatment and control schools. If, in fact, more than ten percent was added to the control school plate waste, a difference would quite possibly have been noticed.

Correlation of cognitive and affective scores with plate waste for students at all three schools pointed out one of the great flaws of nutrition education. That is the belief that an increase in knowledge will result in a change in behavior. There were two significant correlations in attitudes and plate-waste decreases, although they are small in comparison to the number of correlations done and may be random. Still, the traditional health behavior model which incorporates knowledge, attitude, and motivation as all being necessary for behavior change is certainly substantiated by plate-waste scores found in this study; i.e., changes in knowledge alone, or attitude, or both do not necessarily cause a change in behavior.

In summary, plate-waste studies seem to be of little value. The children participating may not be representative of the population. The foods served are those that are easy to prepare, easy to eat, and acceptable by the majority of children in a given school district. There is no correlation with knowledge gained or attitude formation with the somewhat nonrepresentative subgroup of the population and their food intake at lunch. Finally, it should be recognized that the food which is consumed by a captive audience in the lunchroom, many as free lunch participants, cannot be said to be representative of what the parents are providing in the home.

Limitations to the Study

While it may be hypothesized that parent education affected the

food behavior of the children, certain limitations must be considered. Parent education in any discipline may have led to more interaction between parent and child; hence, better bonding may have occurred. Improvement in this parent-child relationship could have then lead to the general improvement in caretaking which would include, possibly, the service of more nutritious meals.

One further consideration which must be addressed is that of sensitization of the parents by the newsletter in order that they would respond to the questionnaire in a "better" manner than parents who did not receive the newsletter. However, because of the similar rate of return of the questionnaire from parents at both the SPI and SI schools, the interest appeared to be the same. Further, the number of individual food items (i.e., milk, meats, fruits, cereals, and soups) was insignificantly different at both schools, although the dietary quality and diversity showed significant differences.

The fact that the control school inadvertantly scheduled recess before lunch on the first posttest days was totally beyond the control of the researcher. The outcomes of the plate-waste study, coupled with this occurrence, however, are interesting for conjecture.

Conclusions

Based on the results of this study, it may be said that providing parents with nutrition information while their primary grade school children are receiving nutrition education at school can be considered to be effective in an upper socioeconomic environment. The outcomes of such a combined program are a better diet for the child in terms of quality of the daily diet and diversity, or variety of food provided and

accepted in the home. As the goal of nutrition education is better nutritional status, homes in which the parents are being concomitantly educated will provide the child with better foods and a wider variety of foods from which to make food selection. Thus, the nutritional and, thereby, general health status of the child will be improved since he can actualize his classroom learning in his daily food behavior. Inasmuch as the key to a nutritious diet is believed to be eating a wide variety of foods, the importance of food diversity cannot be overstated.

A nutrition education program will result in increased nutrition knowledge and development of positive attitudes. Kindergarten and first grade students may show improved cognition as a result of parent involvement. Peer pressure may be reflected in the attitude scores of children over age seven and may produce a certain amount of cognitive dissonance.

Plate-waste studies cannot be used as the only measure of food behavior in nutrition education programs. This measure is extremely limited and biased in favor of the segment of the given population who is eating a free school lunch. Further, this is only one meal a day and may or may not reflect the food available to the child on a 24-hour-a-day basis (Head, 1974). This measure may be more reflective of behavior in school districts which are heavily subsidized and contain a large population who eat school lunch and are discarding much of it as waste.

Recommendations

To make an elementary school nutrition education curriculum as effective as possible, a parent education component should be included. The strategies used should be tailored to the population. In any event,

the effort to encourage the home to provide a wide variety of nourishing foods for the child should be the primary objective.

Instruments which measure attitudes about food and nutrition with high reliability coefficients need to be developed. These instruments are needed for all levels of age and socioeconomic status of the national population.

The level of nutrition knowledge of elementary school teachers reflects that of the country's population today, which is relatively poor. Only with knowledge, confidence, and insight can nutrition concepts and attitudes be effectively taught in the classroom. Preservice nutrition education for teachers is the only expedient method by which students can be assured of receiving sound education in nutrition.

Nutrition education should begin as early as possible in a child's life. Before children learn to read and write, they are capable of having many "hands-on" experiences with food. The beginning of knowledge is this kind of familiarity, which encourages development of positive attitudes toward food. Only with good feelings about food can nutrition be accepted as a positive realm of one's life.

Finally, the foundation of good health lies in good nutrition. The impetus for nutrition education is very strong at this point in time when health holds a high premium for most sectors of the population and food, which contains the "parts" or the nutrients, is becoming more expensive. Nutrition education is needed now more urgently than ever, but the way in which nutritionists plan and implement nutrition curricula will determine the success or failure of their initiative.

REFERENCES CITED

- Adelson, S. F. Some problems in collecting dietary data from individuals. Journal of the American Dietetic Association, 1960, 36, 453-457.
- American Dietetic Association. Position paper on child nutrition programs. Journal of the American Dietetic Association, 1974, 64, 520-521.
- Baker, M. J. Influence of nutrition education on fourth and fifth graders. Journal of Nutrition Education, 1972, 4, 55-58.
- Bass, M. A.; Wakefield, L.; & Kolasa, K. Community nutrition and individual food behavior. Minneapolis: Burgess Publishing Company, 1979, 61-73.
- Bell, C. G., & Lamb, M. W. Nutrition education and dietary behavior of fifth graders. Journal of Nutrition Education, 1976, 8 (3), 196-199.
- Beyer, N. R., & Morris, P. M. Food attitudes and snacking patterns of young children. Journal of Nutrition Education, 1974, 6 (4), 131-133.
- Birch, L. L. Preschool children's food preferences and consumption patterns. Journal of Nutrition Education, 1979, 11 (4), 189-192.
- Borg, W. R., & Gall, M. D. Educational research: An introduction (2nd ed.). New York, New York: Longman, 1971, 142, 359-360.
- Brown, G. Development and evaluation of a nutrition education curriculum for elementary school. Unpublished dissertation, Utah State University, 1977.
- Burt, J. V., & Hertzler, A. A. Parental influence on the child's food preference. Journal of Nutrition Education, 1978, 10 (3), 127-129.
- Caliendo, M. A., & Sanjur, D. The dietary status of preschool children: An ecological approach. Journal of Nutrition Education, 1978, 10 (2), 69-72.
- Callahan, D. L. Inservice teacher workshops. Journal of Nutrition Education, 1973, 5 (4), 233-238.
- Carver, L. R., & Lewis, K. J. A nutrition knowledge test for elementary school teachers. Journal of Nutrition Education, 1979, 11 (2), 68-71.

- Christensen, E. W.; Wyse, B. W.; Brown, G.; & Harding, D. J. Effects of food location on the tray and scheduling of playtime on food consumption. School Food Service Research Review, 1979, 3 (1), 16-20.
- Cook, G. C.; Eiler, D. A.; & Kaminaka, E. C. How much nutrition education in grades K-6? Journal of Nutrition Education, 1977, 9 (3), 131-134.
- Cooper, B., & Philips, M. Evaluation of nutrition education in an everyday teaching environment. Journal of Nutrition Education, 1974, 6 (3), 73-76.
- Dwyer, J.; Feldman, J. J.; & Mayer, J. Nutrition literacy of high school students. Journal of Nutrition Education, 1970, 2 (2), 59-61.
- Egan, M. G.; Goodwin, M.; & Marezki, A. Pregnant women, children and adolescents. Journal of Nutrition Education, 1980, 12, Supp. 1, 121-128.
- Emmons, L.; & Hayes, M. A. Nutrition knowledge of mothers and children. Journal of Nutrition Education, 1973, 5 (2), 134-139.
- Eppright, E. S.; Fox, H. J.; Fryer, B. A.; Iamkin, G. H.; & Vivian, V. M. The north central regional study of diets of preschool children: 2. Nutrition knowledge and attitudes of mothers. Journal of Home Economics, 1969, 62, 327-331.
- Fisk, D. A successful program for changing children's eating habits. Nutrition Today, 1979, 14 (3), 6-10.
- Fodor, J. T. Framework for health instruction in California public schools. Sacramento, California: State of California, Department of Education, 1969.
- Frank, G. C.; Voord, A. W.; Schilling, P. E.; & Berenson, G. S. Adapting the 24-hour recall for epidemiological studies of school children. Journal of the American Dietetic Association, 1977, 71 (1), 14-19.
- Frankle, R. M., & Owen, A. Y. Nutrition in the community: The art of delivering services. St. Louis, Missouri: C. W. Mosby Co., 1978, 213-214.
- Gersovitz, M.; Madden, J. P.; & Smicklas-Wright, H. Validity of the 24-hour recall and seven-day record for group comparison. Journal of the American Dietetic Association, 1978, 73, 48-55.
- Grogan, J. Teacher inservice for nutrition education--An interdisciplinary approach in the school system. Journal of Nutrition Education, 1978, 10 (3), 127-132.

- Grotowski, M. L., & Sims, L. S. Nutrition knowledge, attitudes and dietary practices of the elderly. Journal of the American Dietetic Association, 1978, 72, 499-502.
- Guthrie, H. Identifying needs and then what? Journal of Nutrition Education, 1978, 10 (2), 52.
- Head, M. K. A nutrition education program at three grade levels. Journal of Nutrition Education, 1974, 6 (2), 56-59.
- Helnick, S. A. Family living patterns--Projections for the future. Journal of Nutrition Education, 1978, 10 (4), 155-157.
- Kirk, R. H.; Hamrish, M.; & McAfee, D. Nutrition in health instruction: The Tennessee health education project. Journal of Nutrition Education, 1975, 7 (2), 68-71.
- Lewin, K. A group test for determining anchorage points of food habits. A preliminary report on a study. Child Welfare Research, State University of Iowa, 1943.
- Leverton, R. What is nutrition education? Journal of the American Dietetic Association, 1974, 64, 17-20.
- Lovete, R. R.; Barker, E.; & Marcus, B. The effect of a nutrition education program at the second grade level. Journal of Nutrition Education, 1970, Fall, Suppl. 1, 31-95.
- Lowenberg, M. Early feeding patterns. In P. L. Pipes (ed.) Nutrition in infancy and childhood. St. Louis, Missouri: C. L. Mosby, 1977.
- Madden, J. P.; Goodman, S. J.; & Guthrie, H. A. Validity of the 24-hour recall. Analysis of data obtained from elderly subjects. Journal of the American Dietetic Association, 1976, 68, 143-147.
- Maretzki, A. N. A perspective of nutrition education and training. Journal of Nutrition Education, 1979, 11 (4), 176-180.
- National Nutrition Consortium Board. Statement of nutrition education policy, 1980. Journal of Nutrition Education, 1980, 12 (3), 138-140.
- Patterson, L. Dietary intake and physical development of Phoenix area children. Journal of the American Dietetic Association, 1971, 59, 106-110.
- Peterson, M. D., & Kies, C. Nutrition knowledge and attitudes of early elementary teachers. Journal of Nutrition Education, 1972, 3 (4), 11-15.
- Poolton, M. A. Predicting application of nutrition education. Journal of Nutrition Education, 1972, 3 (3), 110-113.

- Richmond, F. W. The role of the federal government in nutrition education. Journal of Nutrition Education, 1977, 9 (4), 150.
- Robinson, C. Nutrition education--What comes next? Journal of the American Dietetic Association, 1976, 69, 126-132.
- Schaffer, A. E. The national nutrition survey. Journal of the American Dietetic Association, 1969, 54, 371-375.
- Smith, H. M., & Justice, C. L. Effects of nutrition programs on third grade students. Journal of Nutrition Education, 1979, 11 (2), 92-95.
- Sodowsky, J. Inservice nutrition education for elementary teachers. Journal of Nutrition Education, 1973, 5 (2), 139-141.
- Todhunter, E. N. Approaches to nutrition education. Journal of Nutrition Education, 1969, 1, 8-10.
- Ulrich, H. Towards a national nutrition education policy. Journal of Nutrition Education, 1979, 11 (2), 60.
- U.S. Department of Health, Education & Welfare. Preliminary findings of the first health and nutrition examination survey. U.S. 1971-1972. Washington, D.C., 1973, Pub. No. (HRA) 74-1219-1, Government Printing Office, 42-47.
- U.S. Department of Health, Education & Welfare. Health. United States 1979. U.S. Government Printing Office, 1979, 31-43.
- U.S. White House. White House conference on food, nutrition and health: Final report. Washington, D.C.: Government Printing Office, 1969, 151-159.
- Whitehead, F. E. Nutrition education for children in the United States since 1900, parts I & II. Journal of the American Dietetic Association, 1960, 33, 880-889.
- Wolff, H. K. Results of pilot testing of three cognitive tests for nutrition education in preschool through sixth grade. Chico, California: Institute of Local Government, 1979.
- Wolff, H. K. Evaluation of the curriculum guide for nutrition education, preschool through grade six. Chico, California: Butte Canyon Research Associates, 1980.
- Young, C. M.; Hagen, G. C.; Tucker, R. E.; & Foster, W. D. A comparison of dietary study methods. II. Dietary history vs. 24-hour recall. Journal of the American Dietetic Association, 1952, 28, 218-221.
- Young, S. A., Program Director, Education Division, Dairy Council of California. Personal communication, October 1977.

Yperman, A. M., & Vermeersch, J. Factors associated with children's food habits. Journal of Nutrition Education, 1979, 11 (2), 72-76.

APPENDICES

Materials Used for Methods and Treatment

APPENDIX A
INTRODUCTORY LETTER

October 22, 1979

Dear Parents,

EATING CAN BE DANGEROUS TO YOUR HEALTH! DO YOU KNOW WHAT YOUR CHILD IS EATING?

During the next few months your child will be involved in a nutrition education project. A special curriculum dealing with food choices, factors influencing choices, food related careers, consumer competencies and food protection will be used for each grade level. The classroom instruction will be done by your child's teacher, who is receiving curriculum materials and in-service instruction through a grant from USDA and the California State Department of Education.

Parent support is critical for the success of this program! We urge you to discuss the concepts and lessons with your child. In addition, we would like to invite you to participate in classroom and lunchroom activities. You will be receiving information regularly concerning the nutrition education program.

Sincerely yours,

Principal

Barbara Kirks
Project Director

APPENDIX B
INITIAL PARENT SURVEY

TO PARENTS:

In conjunction with the nutrition education project taking place in your child's classroom, we ask that you complete this questionnaire and return it to your child's teacher.

Please check any of the following items in which you would be interested in participating and/or receiving:

_____ A newsletter about the progress of the project and other topics of interest.

_____ Workshops on topics of current interest in food, nutrition and health.

_____ day

_____ evening

_____ Family menu analysis for nutrient value.

_____ Nutrition counseling, family or individual.

_____ Classroom cooking experiences.

_____ Cultural food experiences.

_____ Other: Please indicate

Do you have something to share with your child's class related to food, nutrition, or health? If so, please describe.

Are there some topics concerning food, nutrition, and/or health which you would like to know more about? If so, please note below.

Thank You!

Your Name: _____ Phone No. _____

Child's Name: _____ Room No. _____

APPENDIX C
FOOD RECORD FORM

Your Child's Name _____ Age _____ Sex _____

Your Name _____ Phone No. _____

School _____ Grade _____ Teacher _____

DIRECTIONS: Please write the number of times your child ate or drank each of the following food or beverages during one 24-hour period (at meals and between).

Milk _____	Green leafy vegetables _____
Other milk products _____	Orange or dark yellow vegetables _____
Egg _____	Other vegetables _____
Meat, poultry, or fish, _____	Beans, cooked _____
Cereal _____	Cake, cookies, pie, donut, etc. _____
Bread, rolls, or crackers _____	Potato chips, pretzels, chips. _____
Rice, macaroni, spaghetti _____	Soft drinks, popsicles, Koolaid _____
Potato _____	Candy, jelly, jam, syrup _____
Orange or grapefruit juice _____	Butter, margarine, mayonnaise, salad dressing or oil _____
Orange, strawberries or cantaloupe _____	Other foods (specify) _____
Other fruits _____	_____

What specific kinds of the following foods does your child eat most often:

Meats, poultry, fish _____

Fruits _____

Juices _____

Vegetables _____

Milk and milk products _____

Cereals _____

Soups _____

Has your child requested any new foods in the past few months? _____

If yes, what foods specifically? _____

Comments _____

Thank you for your cooperation.

NOTE: PLEASE RETURN BY MAY 20, 1980 !!

APPENDIX D
PARENT NEWSLETTERS

NUTRITION NEWS

Students in the kindergarten through 3rd grades at Sierra View School are currently participating in a nutrition education program. Their teachers are receiving nutrition instruction and are using the brand-new California State curriculum guides and materials for classroom instruction. At the outcome of this program, we hope that the students will know a lot about nutrition, will have developed good attitudes about food, nutrition and health, and will be eating a wide variety of foods.

First things first, however! We'd like to remind you that breakfast is still the most important meal of the day! Without this first input of food-fuel, a child has a very short attention span and can't possibly learn what is being taught in the classroom. Further, the child may demonstrate erratic and irritable behavior when breakfast was skipped, making it hard for him/her to get along with other children, as well as being a disruption in the classroom. So help your child get the most out of the school day by providing that first important meal!

Some breakfast suggestions for busy households:

- Bran muffins and yogurt
- Nut bread and cheese
- Hard-boiled or deviled eggs with toast
- Cottage cheese with cinnamon and applesauce on toast, broiled
- "Health drinks:" milk, eggs, juice and/or fruit, mixed in blender
- Peanut butter and toast, with a glass of milk and an orange wedge
- And of course: A good, enriched, sugarless ready-to-eat cereal

Here's a recipe for Breakfast Bars that can be made ahead and gulped with a glass of milk for a nutritious on-the-run meal:



FROM THE DIRECTOR. . . .

Dear Parents,

Today you are receiving your second copy of Nutrition News. We hope you are enjoying hearing about the project, and are learning some new things about nutrition along with your child.

In tallying the questionnaires we received back from you, we found that 90% of you preferred newsletters to workshops. Thus, we will be sending a newsletter home with your child every two weeks this Spring. Classroom Cooking, ETC.

Those of you who indicated willingness to participate in classroom cooking experiences will be contacted as various activities and lessons are being planned. Thank you for your overwhelming response in this area! Again, if you didn't volunteer before and wish to know, let your child's teacher know about your interest.

Dietary Counseling Services

Some families indicated that they would like individual or family diet counseling. A staff nutritionist will be contacting you personally for this service.

Family Menu Analysis

Many of you indicated that you would like a nutrient analysis of your family menus . . . and we're pleased to tell you that we will begin that right away! Please fill in the attached form as completely as possible. Be sure to indicate all items, such as how much mayonnaise you put on the sandwich. The more complete your menu is, the more accurate the analysis will be. For serving sizes, list those for one member, adult, or child. We can adjust the results for other family members.

Nutrition News

SCHOOL LUNCH — A GREAT BARGAIN

Most people are familiar with the Four Food Groups. Ideally, when planning menus, one food from each group will be included in a meal. You may have heard your child say "Let's see -- what's missing?" when putting together a breakfast or lunch on their own.

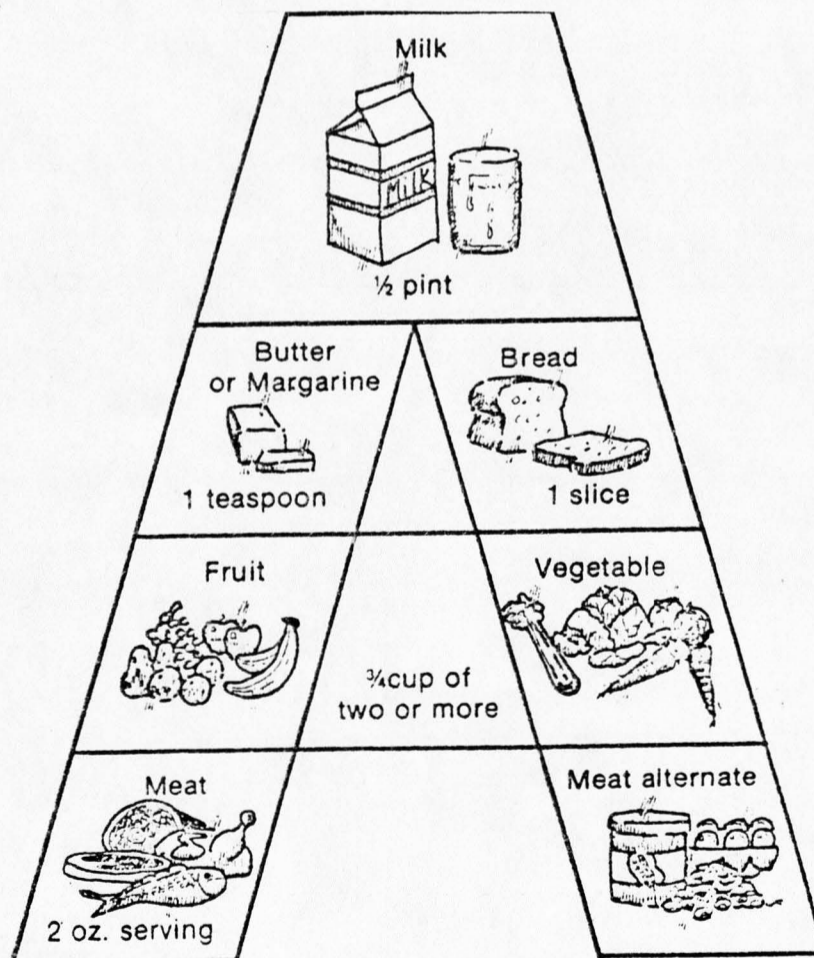
It should come as no surprise then, that the school lunch menu is also planned around the Basic Four, even though it's called a "Type A" lunch, dating back to its conception in the early '40's.

The menus which are available in your school cafeteria no longer reflect the old entrees that were standard fare for the Type A hot lunch when it was originated in the Midwest. Casseroles and stews have been replaced with today's child's favorite foods. And even

though they have similar names as the fast food franchise items, the choices are all very nutritious. You probably haven't considered the contributions from the Four Food Groups that are made by pizza, tacos, burritos or hamburgers -- cheese from the milk group, beans from the meat group, tomato sauce from the fruit and vegetable group, and pizza dough is a member of the bread group!

All these items are made and sold right here in the school district. The lunches provide your child with a nourishing lunch as well as foods which he/she won't be throwing away. Even more -- you couldn't possibly provide lunch at the low cost of cents/nutrient that your school cafeteria does.

Type A Every Day



Any Questions?

Nutrition News will be publishing answers to questions, concerns, and comments parents may have about food, nutrition, and health. We will answer items you mentioned in the questionnaire. Probably by now you have thought of some more questions, right? So we will have a question and answer column beginning with the next edition. If you have a question, return the form attached to your child's teacher, or call me when its convenient! 895-6767 or 895-6805.

Thank you for your continuing interest in the nutrition program.

Barbara Kirks
Project Director

Question or Comment:

Name _____ Phone number _____

Child's name _____ Room number _____

Nutrition News

Published by NET Project

Vol. 1 Number 2

SPICE OF LIFE

Did you know that variety is actually the key to good nutrition?

When we select foods from the food groups to make up a nutritious meal, we're actually choosing foods which are sources of major nutrients. The food groups are actually categories of eight "leader" nutrients. So when you choose a food from the milk group, you're actually choosing a source of calcium for the bones; with this "leader" you're actually getting other nutrients as well: protein, riboflavin, vitamins A and D.

The meat group, as everyone knows, provides most of our protein--but by using red meats we get iron and zinc, too. If using beans or seeds, we also get several "trace" minerals and vitamins which aren't commonly heard of--such as pyridoxine, folic acid and magnesium.

Breads and cereals, frequently considered the dieters foe, are good sources of lots of vitamins and minerals, particularly when whole grains are used. True,

they do provide carbohydrate--but 50% of our diet should be put together with these "starches." As a nation, we have for many years turned away from carbohydrate, and have consequently been eating too much meat and dairy foods, which contain lots of animal (saturated) fat along with the protein. Fats and oils have more than twice the numbers of calories per ounce that carbohydrate does.

Fruits and vegetables give us vitamins and minerals, primarily. The leader nutrients we usually talk about here are vitamins A and C. By choosing to eat a wide variety of these foods we can incorporate many more nutrients in our diet than if we limit ourselves to the same foods from each group all the time.

Remember this--there are 55 known nutrients. By increasing the number of foods you eat from a group over a period of time, you will get a wide variety for an interesting diet tastewise. And you will also be getting many more nutrients in your diet for better health.



For Variety SPICY Lasagna

Menu

Spinach - Pepperoni Lasagna
Green Salad with Sunflower Seeds
French Bread

Spinach - Pepperoni Lasagna

½ lb. lasagna noodles	8 oz. tomato sauce
1 (10 oz.) pkg. of frozen spinach	1½ tsp. anise (ground)
½ lb. mushrooms (sliced)	½ tsp. garlic powder
2 oz. pepperoni (sliced thinly)	½ tsp. basil
8 oz. mozzarella cheese (grated)	½ tsp. oregano
3 TB. parmesan cheese	
1 lb. cottage cheese	

Cook lasagna noodles by boiling in salted water 10 minutes.

Make sauce by mixing tomato sauce, anise, garlic powder, basil and oregano. Cook spinach. Cook mushrooms.

In 1-1/2 quart casserole make 3 layers with tomato sauce, noodles, mozzarella cheese, cottage cheese, parmesan cheese, pepperoni, spinach, and mushrooms on each layer, ending with sauce.

Bake at 350° for 35 minutes.

Let stand 5 minutes before serving. Serves 6.

Viva Variety!

ENCHILADAS

1 Tb. oil	6 oz. can tomato paste
1/3 cup chopped green pepper	15 oz. can kidney beans, drained and mashed
½ c. chopped onion	½ c. lowfat cottage cheese
1/8 tsp. chili powder	1/4 tsp. pepper
½ tsp. rosemary	2 oz. Monterey jack cheese, grated
1 green chili pepper, seeded and finely chopped	8 corn tortillas
1 lb. tomatoes	

Cook onion in oil until transparent. Add green pepper and chili pepper, lower heat and spices, tomatoes (reserve liquid), 3 Tb. tomato paste, mashed beans and cottage cheese. Mix well. Place 3 Tb. of bean and cheese mixture in each tortilla. Roll closed and place in baking dish. Mix remaining tomato paste and liquid from tomatoes and pour evenly over enchiladas. Top with grated cheese and bake at 350 degree for 30 minutes. (serves 4 at about 320 calories per serving)

SERVE WITH A TOSSED GREEN SALAD AND FRESH FRUITS.

Nutrition News

Published by NET Project

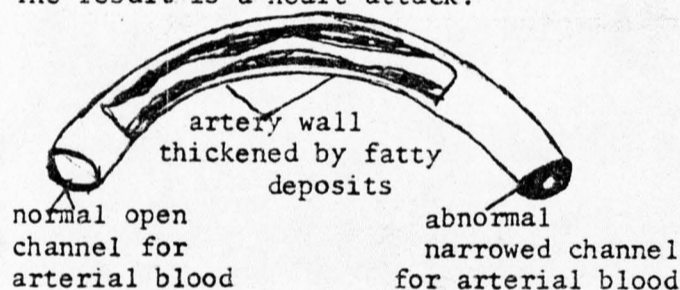
Vol 1 Number 3

WHY WORRY ABOUT FAT?

Probably one half of your daily diet is fat. The average American consumes 45% of his total calories from this type of food. High fat diets sometimes result in higher blood cholesterol, which can lead to heart disease. Reducing intake to 30% of total daily calories is recommended for better health.

WHAT IS CHOLESTEROL?

Cholesterol is a fat-like substance that is part of a culprit called plaque. Plaque can be deposited on the artery walls, in the same way that minerals from hard water collect on the inside of water pipes. Eventually the excess plaque build-up can completely close the artery. The result is a heart attack.



Choosing to eat less fat, especially saturated fat, may result in lower blood cholesterol, thereby decreasing plaque formation.

WHAT ARE SATURATED AND POLYUNSATURATED FATS?

Saturated fats have been proven to increase blood cholesterol levels. They are found in animal foods such as beef, pork, milk, cheese and butter. In other words, they are always solid like butter at room temperature, not liquid like oil!

On the other hand, polyunsaturated fats have been proven to decrease blood cholesterol. These are found in plant foods such as vegetable oils which include safflower, sunflower, corn, and soybean oils. They are always liquid at room temperature!

WHAT FOODS ARE HIGH IN FAT?

Obviously, butter, oil and trimmable fat from meat are high fat foods. But, many foods have invisible or hidden fats. For instance, marbling, which is fat dispersed throughout meat cannot be seen. You may not realize that whole milk, low-fat milk and cheese have fat. Avocado, olives, nuts and peanut butter have large amounts of hidden fat, although they are polyunsaturated.

Remember hidden fats. They are part of the goal to reduce fats to 30% in your diet.

Chinese Style Chicken

Serves 4 at 200 Calories per Serving
Total Recipe Calories 800

- | | |
|---------------------------------------|-------------------------------------|
| 1 medium yellow onion | 1 1/2 C. fresh bean sprouts (3-oz.) |
| 2 chicken breasts, cooked and skinned | 2 T. high polyunsaturated oil |
| 3 celery ribs | 3 T. lemon juice |
| 4 green onions, with stalks | 2 T. sesame seeds |
| 1 small can bamboo shoots | |
| 6 water chestnuts | |
| 1 C. fresh, sliced mushroom (2-oz.) | |

Slice all vegetables except bean sprouts into small, thin strips. Dice the chicken breasts into 1/2" cubes. Heat oil in frying pan or wok and add all of the vegetables. Fry quickly, stirring constantly for three minutes. Take vegetables out of pan. Add chicken, lemon juice, and sesame seeds to hot pan. Stir fry rapidly for one minute taking care not to let the chicken stick to the bottom of the pan. Add hot chicken to vegetables and mix well. Serve over bed of brown rice.

Bacon TUNA-NOODLE CASSEROLE

Makes 6 servings at 280 calories per serving.

- | | |
|---------------------------|---------------------------------|
| 2, 6 1/2 oz. cans tuna | 1 tsp. oregano |
| 1 C. celery, chopped | 1/2 tsp. basil |
| 1/2 C. onion, chopped | 1/4 tsp. fennel seed (optional) |
| 1, 1 lb. can tomatoes | 8 oz. noodles |
| 1, 6 oz. can tomato paste | 2 T. grated parmesan cheese |
| 1/2 C. water | |
| 1/4 tsp. garlic powder | |

Drain tuna. Use 3 T. of drained oil (if not soybean oil, substitute a high polyunsaturated oil) to cook celery and onion until soft. Add tomatoes, tomato paste, water, garlic powder, oregano, basil, and fennel. Cover and simmer 20 minutes. Meanwhile cook noodles. Lightly grease 2 qt. casserole. Layer in half of noodles. Top with half of tuna mixture and 1 T. cheese. Repeat with remaining ingredients. Bake for 30 minutes at 350°F.

10 Ways To Help Your Heart and Save Money

FOODS TO TRY MORE OFTEN:

1. FISH AND POULTRY (without skin). They're low in saturated fat.
2. LEAN CUTS. When you do eat red meat, choose lean cuts and trim visible fats.
3. FRUITS, NUTS AND RAW VEGETABLES. Try them as snacks.
4. SKIM MILK AND LOWFAT DAIRY PRODUCTS. A double treat---less saturated fats and calories.
5. GRAINS AND STARCHY FOODS.
6. LIQUID VEGETABLE OILS & MARGARINES HIGH IN POLYUNSATURATED FATS. Go easy on all fats. But when you do use them, try these fats.
7. BEANS AND LEGUMES. Contain no saturated fats and save money too!

FOODS TO EAT LESS OFTEN:

8. FATTY LUNCHEON AND VARIETY MEATS AND ORGAN MEATS. Try using less sausage, bacon, salami and bologna.
9. BUTTER. When you do use fat, try a polyunsaturated margarine.

WAYS TO PREPARE FOODS:

10. BROILING, BOILING, ROASTING AND STEWING.

ASK US

How do bologna and hot dogs compare with tuna fish or hamburger as inexpensive sources of protein?

Approximately one-third of the day's protein requirement can be met with a three-ounce serving of tuna or hamburger. To get the same amount of protein from bologna, you would have to eat almost twice as much at more than twice the cost. Three and a half hot dogs, more than the average serving, would give you the same amount of protein at a cost of 50 percent more.

Dried beans are the least expensive source of protein and when combined with cheese or other vegetable proteins can supply a very good quality protein.

YOUR questions are welcomed by Barbara Kirks, Project Director. Please send a note with your child or call 895-6767 or 895-6805.

Joyce Alves
Nutrition Education Specialist
Editor

Nutrition News

Published by NET Project

Vol 1 Number 4

CARBOHYDRATES . . . FRIEND OR FOE?

STARCH

How many times have you heard someone say that you should not eat bread, potatoes, or other starchy foods if you are on a weight loss diet? Contrary to popular belief starchy foods should be a part of a weight loss diet. It's the extra fats and calories that you add that hurts!

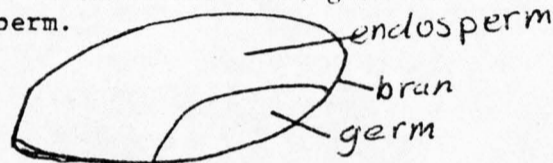
The benefits of eating starchy foods are many. Replacing some of the meat and other high fat foods in your diet with grains, potatoes, breads and noodles will reduce the total amount of fats you eat. Since fats have twice as many calories as starch, weight can be controlled more easily. Foods high in starch are a good source of fiber and some essential vitamins and minerals. They are also the least expensive source of energy.

FIBER

Fiber is a carbohydrate that does not provide calories, but does provide bulk. It is sometimes called the non-nutrient nutrient, because it is so important in the movement of waste material through the body. Fiber is found abundantly in fruits, vegetables and whole grains.

Whole grain products such as whole wheat flour, brown rice and

oatmeal include the bran, germ and endosperm.



Compared to enriched refined grains, whole grains provide additional minerals, vitamins and fiber to the diet. Enriched grain products have nutrients such as iron and some B vitamins _____ thiamin, niacin, and riboflavin. However, whole grains products still provide more fiber.

SUGAR

Although sugar is considered a quick energy food, it's like putting all the wood in a fire at once. It doesn't last and after a short time the energy source is completely burned. Eating starchy foods is like putting wood in the fire slowly, the energy source lasts longer.

Since sugar is a concentrated energy food, it tends to cause weight gain. Replacing high sugar desserts and snacks with fruits, vegetables, crackers, or breads will decrease total calories. Since fiber and starch make you feel better, they could be considered your friend.

WHOLE WHEAT Muffins



Mix 2 cups whole wheat flour, 2 tablespoons sugar, 1 teaspoon baking powder, 1 teaspoon baking soda, 1 teaspoon salt. Add 1 egg, 1½ cup milk, ¼ cup oil. Fill greased muffin tins half full. Bake 425 degrees for 18-20 minutes. Try adding raisins, nuts or dried fruits. Serve with eggs or cereal.

Ask Us

Is honey better for you than sugar?

Table sugar is half glucose and half fructose, where honey has about equal proportions of glucose and fructose. Your body uses fructose and glucose as an energy source, so honey and sugar have exactly the same chemical compounds, and have the same function in your body. Note that fructose is converted to fat faster than glucose.

Your questions are welcomed by Barbara Kirks, project director. Please send a note with your child or call 895-6767 or 895-6805.

Nutrition in the Classroom

Kids are supposed to like candy not vegetables! Well, the kindergarteners at Sierra View don't think so. Although, after their vegetable tasting party, they did decide that raw vegetables smelled, tasted and looked much better than cooked vegetables. They also made butter from cream by shaking it in a mason jar. They now know where butter comes from, but find it easier to buy it at the market.

Mrs. Dalrymple's first graders are still trying nutritious snacks. The latest one is a mixture of bite-size shredded wheat with raisins, peanuts and pretzels. All first graders are relating good nutrition to dental care

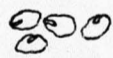


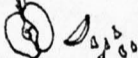


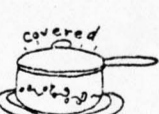

and tasting non-plaque forming snacks.

Which is better peanut butter soup or homemade peanut butter? I'm sure you will agree with Mrs. Koke's second graders that peanut butter with bananas, pineapple and celery is tops, but it is still hard to beat the Irish soda bread that Mrs. Wahl's students prepared and ate with their peanut butter soup.

Mrs. Gilzean's class has been growing alfalfa sprouts and tasting Swiss, Cheddar, Jack and Mozzarella cheese. How about an alfalfa sprout sandwich with cheese?

KIDS KORN ER

THREE BEAR PORRIDGE

 rolled oats ② 3T.	 sunflower seeds ② 1t.	 raisins ③ 1T.	 apple, chopped ④ 1T.
 Powdered Milk ⑤ 1T.	 Hot Water ⑥ 1/2 Stir in.	 covered ⑦ Turn down when bubbles. Simmer for 15 min.	Stir in ⑧ 1t. Honey Eat while warm—when "just right" like Baby Bear's. 

p40

Nutrition News

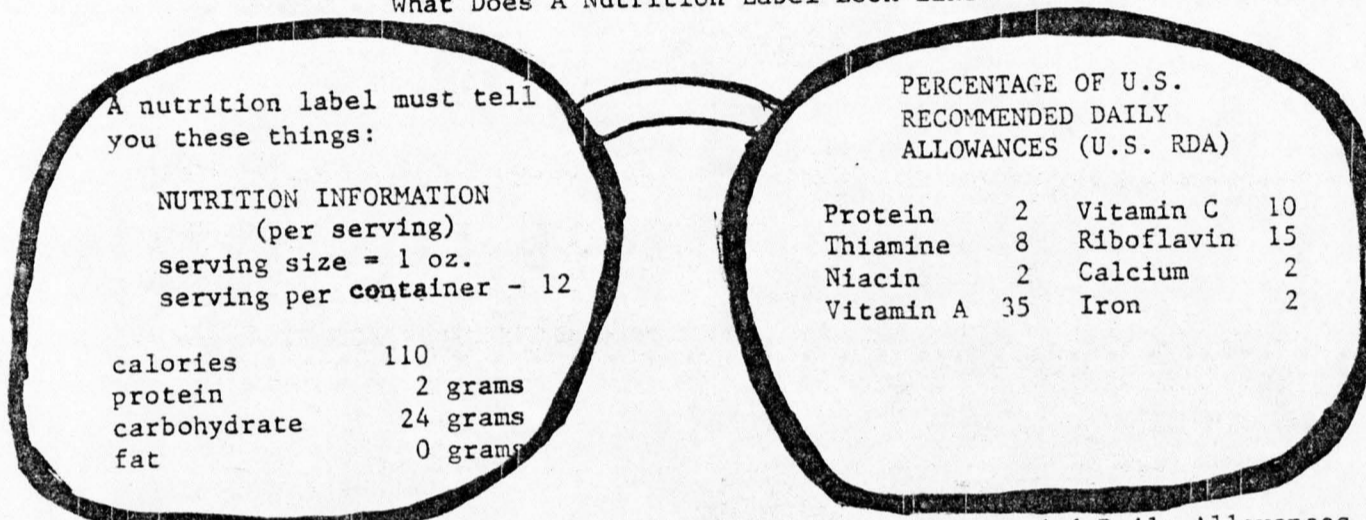
Published by NET Project

Vol 1 Number 5 June 1980

PSST. . . READ ANY GOOD LABELS LATELY?

When you are in the supermarket and trying to decide what to buy for your family, use the nutrition and ingredient labels to get the most for your money.

What Does A Nutrition Label Look Like?



A nutrition label must tell you these things:

NUTRITION INFORMATION
(per serving)
serving size = 1 oz.
serving per container - 12

calories 110
protein 2 grams
carbohydrate 24 grams
fat 0 grams

PERCENTAGE OF U.S.
RECOMMENDED DAILY
ALLOWANCES (U.S. RDA)

Protein 2 Vitamin C 10
Thiamine 8 Riboflavin 15
Niacin 2 Calcium 2
Vitamin A 35 Iron 2

A food label includes:

List of ingredients
. . . what's **first** is the most

The weight and amount (you can use it to compare other products and other brands).

Manufacturers Name and Address

U.S. Recommended Daily Allowances (U.S. RDA) are the daily amounts of protein, vitamins and minerals needed for adults and children ages four or older.

A Nutrition Label May include optional listings for polyunsaturated and saturated fats.

Margarine Nutrition Information	
Portion size.	1 TB
Portions per container	32
Calories.	100
Protein.	0g
Carbohydrate.	0g
Fat (100% of calories)	11g
Polyunsaturated fats.	2 g
Saturated fats.	2 g

LOWEST IN POLYUNSATURATED FATS

Margarine Nutrition Information	
Portion size.	1 TB
Portions per container.	32
Calories.	100
Protein.	0g
Carbohydrate.	0g
Fat (100% of calories).	11g
Polyunsaturated fats.	4 g
Saturated fats.	2g

HIGHEST IN POLYUNSATURATED FATS

Ask Us

What are additives and why are they used?

An additive is anything that is added to food before it goes into a package. There are more than 3,000 different additives.

Vitamins and minerals are added to processed foods to improve their nutritional value: In the cases of breads, noodles, and rice, vitamins and minerals are added to replace some of the nutrients lost in the refining process. But manufacturers may not be able to add all of the nutrients because they don't know how.

Preservatives are an example of one kind of additive. They're put in foods to keep them from going bad or spoiling and so they can stay on supermarket shelves longer.

Some preservatives are harmless. But others may not be. Right now, for example, the government is considering banning the use of sodium nitrate and nitrite as preservatives. Even though these preservatives are useful in keeping some kinds of meats from spoiling, they also cause cancer in animal tests.

Artificial colors and flavors are also examples of additives. And they are very popular. In fact, we use 10 times as many food colorings today as we did 30 years ago.

Government agencies test foods and additives to be sure they are safe. They prevent the use of foods and food additives which may cause problems or be unsafe.

TRY THESE GROUND TURKEY RECIPES.

TURKEY LOAF

1 pound ground raw turkey
 ¼ cup minced onion
 ¼ cup chopped parsley
 1 teaspoon seasoned salt
 ¼ teaspoon pepper
 2 slices bread
 ½ cup very hot milk
 1 egg

Blend together ground turkey, onion, parsley, salt and pepper, mixing well. Soak bread in hot milk; mix in egg. Add to turkey mixture and toss with fork to mix. Turn into greased 8½x-4½x2½-inch loaf pan. Bake in 350° preheated oven for about 1 hour, or until brown. Makes 5 servings, approximately 18¢ per serving; 137 calories per serving and 24 grams protein per serving. Good served with cranberry sauce.

Ground Turkey-Noodle Soup

Mix 1 pound ground turkey with 1 teaspoon thyme leaves, 2 tablespoons *each* minced green onion and cornstarch, ½ teaspoon garlic salt, and ¼ teaspoon pepper.

In a 5-quart or larger pan, bring 2 quarts regular-strength chicken broth to boiling. Press turkey mixture into 1-inch balls and drop into the boiling broth as each is formed. Then add 4 large carrots, cut in ¼-inch slices, 2 medium-size zucchini, cut in ¼-inch slices, 2 stalks celery, cut in ¼-inch slices, and 1 cup uncooked

medium-width egg noodles. Bring to a boil, then reduce heat, cover, and simmer until vegetables and noodles are tender, 8 to 10 minutes. Garnish with chopped parsley. Makes 4 servings.

P.S. IT'S BEEN A GREAT NUTRITIOUS YEAR!

APPENDIX E

LETTER OF INTRODUCTION TO PARENTS OF
TREATMENT SCHOOL CHILDREN

California State University, Chico
Chico, California 95929



Department of Home Economics
(916) 895-6805

April 21, 1980

Dear Parents:

For the past four months a Nutrition Education Program has been on-going in the Chico Unified School District. In order to measure the total impact of the program, we would like a response from parents concerning the kinds of foods your child has been requesting and eating at home.

In a few days, you will receive a brief questionnaire from this office. In order to make our study complete, as well as to justify future programs, we urge you to complete the questionnaire.

In the interest of good nutrition for children everywhere, your participation in this study is appreciated.

Sincerely yours,

Barbara Kirks
Project Director

APPENDIX F
LETTER OF INTRODUCTION TO PARENTS OF
CONTROL SCHOOL CHILDREN

California State University, Chico
Chico, California 95929



Department of Home Economics
(916) 895-6805

April 30, 1980

Dear Parents:

During this year a nutrition education program was started in a few elementary schools in the Chico Unified School District. Next year we plan to add more schools in this project, including Marigold School. In order to reapply for funds for this project, we need to gather some information about the eating habits of the children now enrolled in the primary grades at Marigold.

In a few days you will receive a brief questionnaire from this office. I urge you to take a few minutes to answer the items as accurately as possible. Please be assured that all information will be held in strict confidence.

In the interest of good nutrition for children everywhere, I thank you in advance for your cooperation.

Sincerely yours,

Barbara Kirks
Project Director

APPENDIX G

LETTER ACCOMPANYING FOOD RECORD AND RELEASE FORM

California State University, Chico
Chico, California 95929



Department of Home Economics
(916) 895-6805

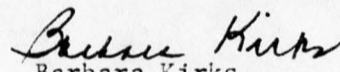
May 5, 1980

Dear Parents:

Attached is a questionnaire regarding your child's food intake and preferences. The questionnaire is for research purposes, as stated in an earlier letter. This research will not involve you or your child in any purpose, risk, or discomfort, any invasion of privacy, or any financial responsibility as a result of your participation. All information will remain completely anonymous and confidential.

Please complete the undersigned and the questionnaire, and return both in the enclosed, stamped, self-addressed envelope.

Thank you for your cooperation.


Barbara Kirks
Project Director

I agree to answer this questionnaire for this research study with an understanding of the details listed above.

Date _____ Signed _____

If you would like a summary of the final summarized results of the study, please add the following information.

Name _____

Address _____

APPENDIX H
REMINDER LETTER TO PARENTS

California State University, Chico
Chico, California 95929



Department of Home Economics
(916) 895-6805

May 15, 1980

To: All Parents

From: Nutrition Education Project

Reminder!

If you haven't already done so, please send in your nutrition questionnaires. These are very important for the continuation of the program in our classrooms.

Thank you!

APPENDIX I
TEACHER EVALUATION OF LESSON FORM

Date _____

Teacher _____ Summary of Responses _____ Grade _____ School _____

1. Which nutrition lesson did you incorporate this week?

2. Approximately how much time did you devote to the lesson(s) during the week?

<u> </u> 15 min.	<u>30%</u> <u>30 min.</u>	<u>20%</u> <u>45 min.</u>	<u>50%</u> <u>60 min.</u>
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3. Was nutrition incorporated into other subject areas; e.g., math, art?

<u>25%</u> none	<u>16%</u> somewhat	<u>31%</u> one area	<u>28%</u> two areas
--------------------	------------------------	------------------------	-------------------------

4. Did concepts from the nutrition inservice give you insight and/or confidence in teaching the lesson(s) this week?

<u>17%</u> not at all	<u>20%</u> a little	<u>47%</u> some	<u>16%</u> a great deal
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5. Please rate pupil enthusiasm for nutrition-related lessons this week.

(low) <u>1</u>	<u>2</u>	<u>17%</u> <u>3</u>	<u>83%</u> <u>4</u> (high)
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6. How would you rate the difficulty level of the lesson for your pupils?

(easy) <u>1</u>	<u>30%</u> <u>2</u>	<u>10%</u> <u>3</u>	<u> </u> <u>4</u> (difficult)
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7. Did the curriculum guide and materials give you adequate materials, explanation, etc., to teach the lessons?

<u> </u> not at all	<u>65%</u> yes	<u>14%</u> a little	<u>20%</u> some gaps	<u>1%</u> very inadequate
-------------------------------	-------------------	------------------------	-------------------------	------------------------------

COMMENTS

Responses were equally divided between the two treatment schools.

APPENDIX J

Minimum Proficiency Levels for California's

Nutrition Education Program

Topics	Minimum standards of performance in nutrition	
	Preschool age/kindergarten (Ages three—five)	Early childhood (Primary grades, ages six—eight)
<p>A. Food Choices Daily food intake is related to the attainment of optimum health.</p> <ul style="list-style-type: none"> • Food classifications make it easier to select foods that will help a person achieve a nutritionally adequate diet. • A variety of foods can be combined to help ensure a nutritionally adequate diet that includes the nutrients that are necessary for optimum health. • Foods contain the nutrients the human body requires to function properly, and the interrelationships among nutrients are important for promoting health. • Nutritional needs vary for individuals. • Food is a component of the ecosystem, and many products can be combined for appropriate menus. • Animal and plant products are substances of the food supply and are components of the ecosystem. 	<p><i>Students will:</i> Name a variety of foods.</p>	<p><i>Students will:</i> Classify the foods in the Basic Four Food Groups. Identify the number of servings needed daily from each of the Basic Four Food Groups. Identify the food groups that should be included within the Type A school lunch.</p>
	<p>Identify one reason why we need food.</p>	<p>Identify two diet-related health problems and the kinds of foods associated with the problems. Identify two sequential steps in the process of digestion.</p>
		<p>Identify one activity which requires less energy (from food) and one activity which requires more energy (from food).</p>
	<p>Classify foods as being of plant or animal origin.</p>	<p>Classify plant foods as fruits, vegetables, or grains. Classify animal foods as meat, poultry, milk, eggs, or fish.</p>

Topics	Minimum standards of performance in nutrition	
	Preschool age/kindergarten (Ages three—five)	Early childhood (Primary grades, ages six—eight)
<p>B. Factors Influencing Food Choices</p> <p>Life-styles, peers, and individual family resources reflect similarities and differences in food choices.</p> <ul style="list-style-type: none"> Eating patterns are formed by interrelationships of physical, social, psychological, environmental, and cultural influences. 	<p><i>Students will:</i></p> <p>Identify one practice that makes mealtime enjoyable.</p> <p>Identify one influence on food choices.</p>	<p><i>Students will:</i></p> <p>Identify two aspects of a school dining environment that may affect eating behavior.</p> <p>Specify two nutritious snack foods that could be brought to school for class parties.</p> <p>Recognize that families have different ways of selecting and serving food.</p>
<p>C. Food-Related Careers</p> <p>Needs, roles, responsibilities, and educational requirements affect choices in food and health nutrition-related careers.</p> <ul style="list-style-type: none"> Food-related occupations exist for society's purposes and contribute to society's ways of living. 	<p>Identify the role of the farmer, food truck driver, storekeeper, and family members in food availability.</p>	<p>Identify two titles of people who process, prepare, or serve food.</p> <p>Identify titles of two health professionals who provide advice on food selection in relationship to dental and general health.</p>

Topics	Minimum standards of performance in nutrition	
	Preschool age/kindergarten (Ages three—five)	Early childhood (Primary grades, ages six—eight)
<p>D. Consumer Competencies Effective utilization of existing resources may enhance the potential for satisfying individual and family nutritional needs and wants.</p> <ul style="list-style-type: none"> • Merchandising techniques influence food selection. • Consumers, through their food choices, affect the production and distribution of food. • Labeling provides consumers information to make satisfying food choices. 	<p><i>Students will:</i></p> <p>Identify one purpose of television commercials.</p> <p>Recognize what we can do to avoid being wasteful when serving ourselves food.</p>	<p><i>Students will:</i></p> <p>Identify how advertisements influence our selection of breakfast and snack foods.</p> <p>Identify one way of decreasing food waste during lunch at school.</p> <p>Given a food label, recognize the main ingredient in the product.</p>
<p>E. Food Handling* The quality and safety of foods are influenced by the handling, processing, and preparing of foods.</p> <ul style="list-style-type: none"> • Food production is influenced by technology and environmental factors. • Food availability and quality is dependent upon food handling techniques. • Sanitation practices in food processing and preparation are necessary for optimum health. <p><small>*Note: Handling means everything that happens to food while it is being grown, processed, preserved, stored, and prepared for eating.</small></p>	<p>Identify what makes plants grow.</p> <p>Specify why and how persons should wash their hands before food is handled or eaten.</p> <p>Identify one way of preparing food for eating.</p> <p>Identify one way to store food that helps to keep it fresh and clean.</p>	<p>Identify two sanitation procedures that should be practiced when preparing food.</p> <p>Identify two ways of cooking food.</p> <p>Identify two foods that must be stored at a cool temperature.</p>

APPENDIX L

STAFF SELF ASSESSMENT
LEVEL I (PRESCHOOL - GRADE 3)

DIRECTIONS: This test is a self-assessment of what you know about nutrition and foods. It will not be graded or turned in. It is designed to help you determine what topics you already know and what topics require further study in order to implement the nutrition education curriculum. The results of your assessment can be shared informally with other staff for planning staff development or in-service programs.

Please read each of the following questions and write your answers in the spaces provided. Work at your own pace. You don't have to finish the entire assessment at one time. Check your answers with the answer sheet each time you have completed five to ten questions.

1. What are two reasons for which the body needs the nutrients obtained in food?
- for energy
 - for growth, maintenance and repair of body tissue
 - for regulation of body functions

2. What are the six nutrient classes?

protein	minerals
carbohydrate	vitamins
fat	water

3. List one good food source and one function for each of the following nutrients?

<u>Nutrient</u>	<u>Food Source</u> (examples)	<u>Function</u>
protein	meat, beans	tissue building
vitamin A	dark green leafy vegetables	skin, eyes, teeth, growth & devel.
vitamin C	citrus fruits, tomatoeb	mucus membranes, iron utilization
calcium	milk	formation & maintenance of bones
iron	dark green leafy vegetables liver, meat, egg yolk	teeth hemoglobin formation

4. How can the vegetarian diet be adequate, balanced, and healthy?

Use alternate animal protein sources (eggs, milk, cheese) and/or combine vegetable proteins (cereals, grains, legumes, nuts, seeds) to balance essential amino acids.

-2-

5. List the component parts of the Basic Four Groups and the number of servings that a preschool child should have from each group:

<u>Food group</u>	<u>Number of Servings</u>
<i>milk</i>	<i>3</i>
<i>bread</i>	<i>4</i>
<i>fruits & vegetables</i>	<i>4</i>
<i>meat</i>	<i>2</i>

6. Name two diet related child health problems.
obesity and dental caries
7. Describe two characteristics of a healthy child.
sound teeth, smooth shiny hair, clear bright eyes, active, alert, interested, well developed firm muscles
8. What is a calorie?
a measure of the energy value of foods
9. What is the result of consuming more calories than the body needs?
weight gain
10. What is the recommended dietary allowance?
guidelines for nutrient intake for specific ages and sexes
11. Explain the process of digestion from when food is taken into the body until it is eliminated.
chewing, swallowing, breakdown of food in the stomach, absorption of nutrients in the small intestine and elimination of waste materials in the large intestine
12. Why should the diet contain a variety of foods each day?
because no one food or food group contains all the nutrients necessary for good health
13. What are the two sources (origins) of food?
animal and plant

-3-

14. Name one food that is obtained from the following:
- a plant root - *potatoes, turnips, radishes, carrots*
 - a plant stem - *celery, asparagus, broccoli stalks*
 - a plant leaf - *spinach, collard green, romaine*
 - a plant flower - *cauliflower, broccoli*
15. Name two plant foods that can be classified as follows:
- fruit - *banana, apple*
 - vegetable - *corn, broccoli*
 - grain - *wheat, barley*
16. Describe the difference between enrichment and fortification.
- Enrichment provides some of the minerals and vitamins lost during processing while fortification adds nutrients to a food which were not originally present*
17. List one benefit and one problem associated with the use of food additives.
- Benefits - prolong shelf life, enhances flavor and color, improves nutritional value*
- Problems - Some additives have been shown to cause cancer in laboratory animals. Some additives may not be necessary.*
18. What are two home food storage practices that help retain the nutritional value of foods?
- freezing, refrigerating, keeping in air-tight containers, storing in a dry place*
19. What are two home preparation methods that help retain the nutritional value of vegetables?
- Cooking in the skins, using a steamer, stir-frying, boiling in small quantity of water for short time*
20. What are two sanitation practices that should be used when preparing food in the classroom?
- Wash hands, use clean kitchen equipment, wash food preparation surface with hot, soapy water - rinse well, keep hair out of food.*

-4-

21. Name one government agency that is responsible for food protection
State and County health departments and U. S. Dept. of Agriculture, Food and Drug Administration.
22. Name two health professionals who provide advice on food selection in relationship to dental or general health:
*Nutritionist Doctor Nurse
Dietitian Dentist*
23. Name two careers in the food production and/or food handling industry.
farmer, truck driver, processor, store keeper
24. Name two careers in the food service industry.
cook, waiter, bus boy, Chef, Food Service Manager
25. What is one benefit of nutritional labeling?
*Aids in selection of foods
Allows comparison of the nutritional content of foods*
26. Where in the list of ingredients on a food label is the main ingredient listed?
The first one
27. Lunch served to children at school in a type A pattern or in a child care food program should provide what amount of their Recommended Dietary Allowances.
1/3
28. What are the five components of the Type A lunch pattern?
*2 oz. (1½ Preschool) high protein food (meat, poultry, fish, cheese, nuts, beans)
¾ cup (½ cup preschool) fruit or vegetable
1 serving bread (roll, biscuit, bun, tortilla)
1 teaspoon butter or margarine
½ pint (1 cup Preschool) milk*
29. List two ways in which the family life style affects the eating patterns of children
*food commonly available
how they are prepared*
30. List one positive and one negative way in which the classroom can influence a child's food selection practices.
*Positive - by serving nutritious snacks
Negative - not giving the opportunity to have new food experience by permitting negative peer pressure regarding food*

-5-

31. Suggest four foods that could be served as alternatives to candy and soda at school parties.

fresh fruits *cheese cubes*
fresh vegetables *milk drinks*
whole grain cereals

32. Name two professional associations you could contact to obtain reliable nutritional information.

heart association *local dietetic association*
dental association *diabetic association*
medical association

33. What are three objectives of nutrition education?

information acquisition, values awareness, behavior change

34. List one positive and one influence of advertising on food selection.

Know what is available on the market, doesn't give all the facts

35. What is one way to avoid being wasteful with food?

Select only the amount of food you think you can eat.
Save left-overs for later

APPENDIX M

OUTLINE FOR TEACHER IN-SERVICE NUTRITION COURSE

Chico Unified School District

1979-1980

- I. Food contains nutrients the body requires for proper functioning and promotion of health.
 - A. Nutrient classes
 1. What is a nutrient
 2. natural vs synthetic vitamins
 - B. Functions of nutrients
 1. Energy and weight control diets
 2. Protein and vegetarian diets
 3. Carbohydrates
 - 1) Starches and sugars
 - 2) Dental health
 - 3) Other health problems associated with carbohydrate intake
 4. Fat, cholesterol and heart disease
 5. Minerals
 - a. Iron
 - b. Calcium
 - c. Salt (hypertension)
 6. Vitamins
 - a. A
 - b. B-complex
 - c. C
 7. Water
 - C. Digestion, Absorption, and Metabolism of Nutrients
 1. Digestive pathway
 2. Processes of digestion
 - a. mechanical
 - b. chemical
 3. Absorption
 4. Metabolism
 5. Functions of Dietary Fiber

II. Nutrient needs vary for individuals.

- A. Recommended Dietary Allowances
- B. Dietary Goals
- C. Nutritional needs and status of school-aged children

III. A variety of foods can be combined to ensure a balanced diet

- A. The quality and safety of foods are influenced by the handling, processing, and preparation.
 - 1. Food production
 - a. Growth needs of plants and animals
 - b. Organic and natural foods
 - 2. Food processing
 - a. Enrichment and fortification
 - b. Use and safety of food additives (hyperactivity)
 - 3. Food storage, preservation, and preparation
 - a. Food microbiology and principles of sanitation
 - b. Food Preparation and nutrient retention
- B. Food classifications systems help with food selection
 - 1. The Basic Four - uses and abuses
 - 2. Type A lunch pattern
 - 3. Cultural food patterns
- C. Consumer competencies maximize the use of food resources
 - 1. Use of food labels
 - 2. Economizing in the food budget

IV. Eating patterns are formed by interrelationships of physical, social, psychological, environmental and cultural influences.

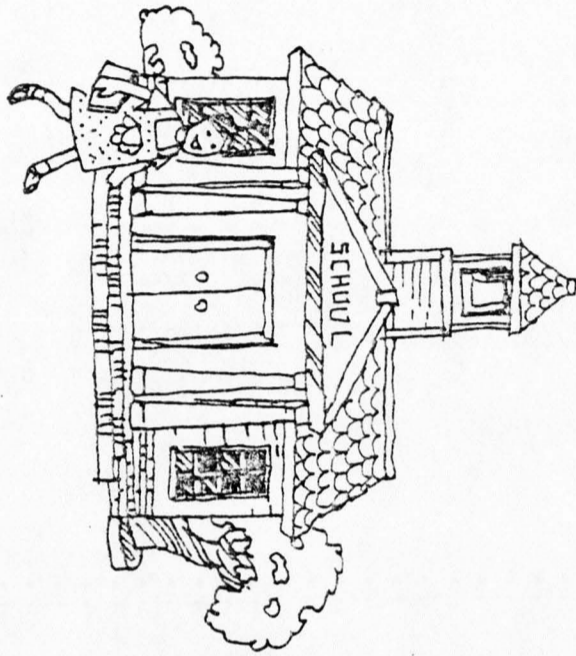
- A. Objectives of nutrition education
 - 1. Information acquisition
 - 2. Values awareness
 - 3. Behavior change
- B. Evaluating and using nutrition information
 - 1. Values vs facts
 - 2. Identify sources of reliable information
 - 3. The influence of advertising
- C. Values awareness teaching strategies to determine influences of social, psychological, environmental, and cultural factors on food choices.

Test Instruments

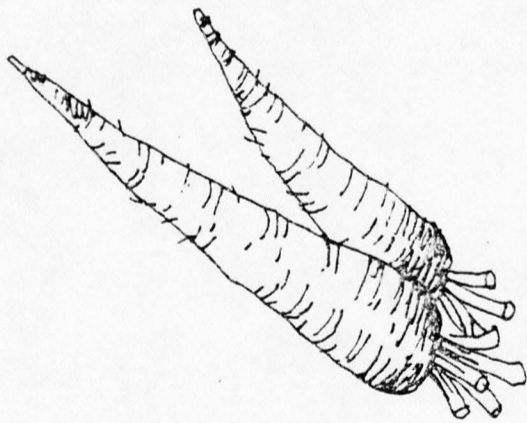
APPENDIX N

KINDERGARTEN POSTTEST - SAMPLE ITEM

Sample: What is a food that people eat?



a. School



b. Carrots

APPENDIX O
COGNITIVE POSTTEST - GRADES ONE-THREE

NUTRITION EDUCATION ASSESSMENT

PART I

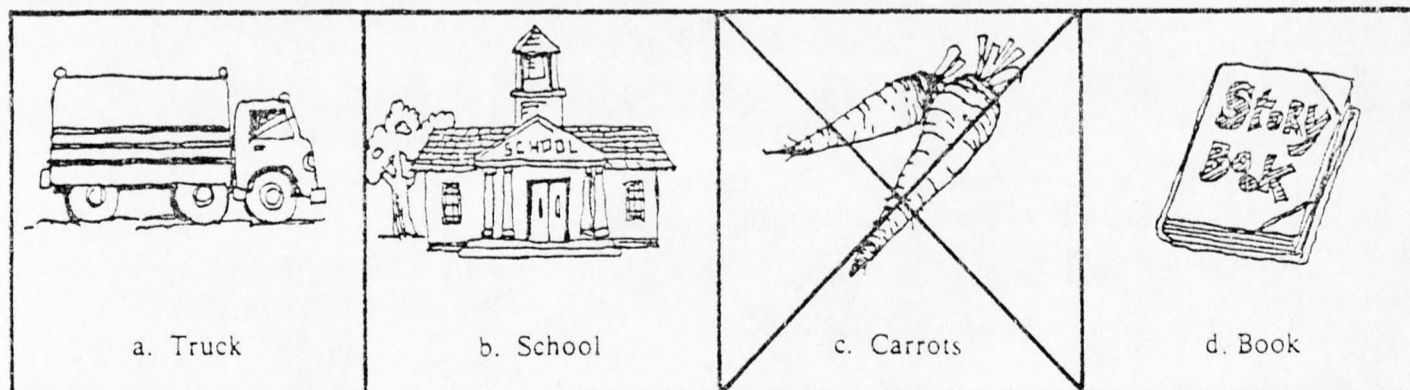
NUTRITION KNOWLEDGE TEST

Grade One

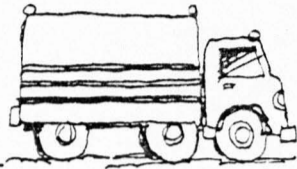



Test Two and Three contained the identical items without pictures.

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Student's Identification Number:	<input type="text"/>	(16-19)	
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Sex:	Male <input type="checkbox"/> (1)	(21)	
	Female <input type="checkbox"/> (2)		
Grade:	<input type="text"/>	(22)	
Number of Previous Years in NETP:	<input type="text"/>	(23)	
Test Version:	English <input type="checkbox"/> (1)	Spanish <input type="checkbox"/> (2)	Chinese <input type="checkbox"/> (3) (24)
(check one)			

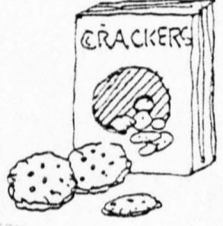


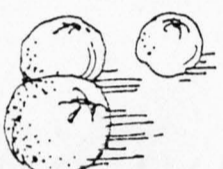
Sample: What is a food that people eat?







Sample: What is a food that people eat?

 <p>a. Truck</p>	 <p>b. School</p>	 <p>c. Carrots</p>	 <p>d. Book</p>
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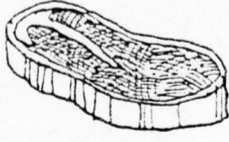

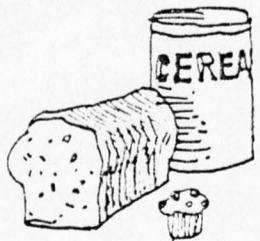
1. Which food needs to be kept in the refrigerator?

 <p>a. Crackers</p>	 <p>b. Cottage cheese</p>	 <p>c. Bananas</p>	 <p>d. Oranges</p>
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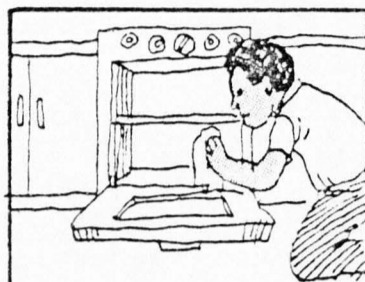

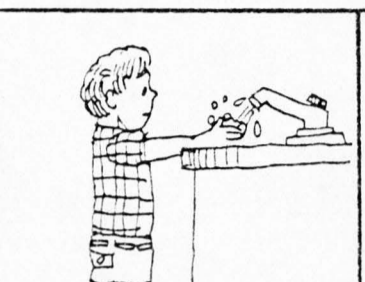

2. Who could tell you the most about what food does for your body?

 <p>a. Grocer</p>	 <p>b. Farmer</p>	 <p>c. Baseball player</p>	 <p>d. Doctor</p>
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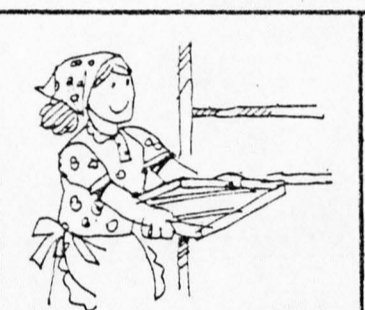

3. Tortillas belong in what food group?

 <p>a. Milk</p>	 <p>b. Meat</p>	 <p>c. Fruits and vegetables</p>	 <p>d. Breads and cereals</p>
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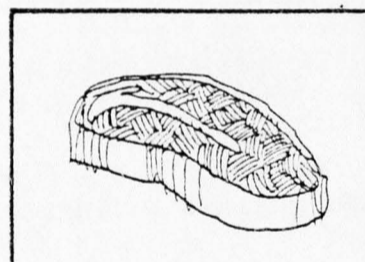
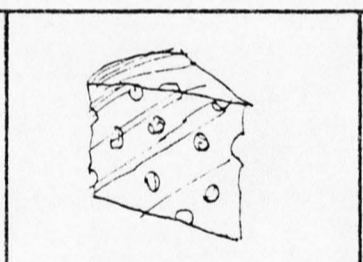
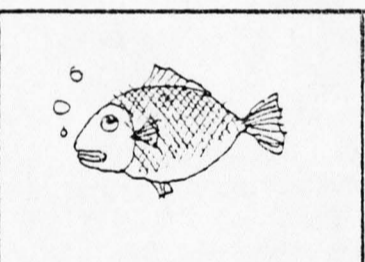
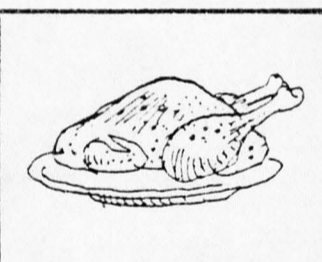
4. What should you always do before you cook food?

 <p>a. Clean the oven.</p>	 <p>b. Lick the spoon.</p>	 <p>c. Wash your hands.</p>	 <p>d. Taste the ingredients.</p>
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5. What person makes bread?

 <p>a. Cook</p>	 <p>b. Grocer</p>	 <p>c. Baker</p>	 <p>d. Butcher</p>
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6. What kind of food is chicken?

 <p>a. Meat</p>	 <p>b. Cheese</p>	 <p>c. Fish</p>	 <p>d. Poultry</p>
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7. What should you do when a new food is served to you for lunch?

 <p>a. Trade it with your friends.</p>	 <p>b. Give it to your friend.</p>	 <p>c. Save it for later.</p>	 <p>d. Eat it.</p>
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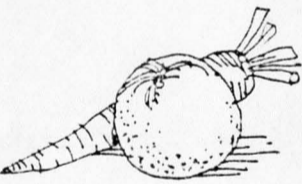
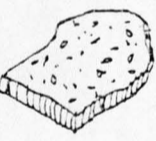

8. If you met people who lived in another country, what would they eat?

<p>Only the foods that you eat</p> <p>a.</p>	<p>Some foods different from those you eat</p> <p>b.</p>	<p>Foods that are not healthful</p> <p>c.</p>	<p>Foods that grow only in America</p> <p>d.</p>
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9. What kind of food is wheat?

 <p>a. Fruit</p>	 <p>b. Vegetable</p>	 <p>c. Grain</p>	 <p>d. Seed</p>
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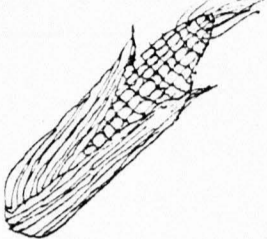
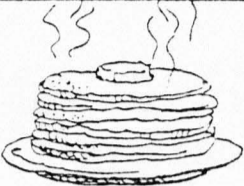


10. Your school meal pattern lunch has milk, meat, one vegetable, and one slice of bread. What is missing?

 <p>a. A dessert</p>	 <p>b. One more vegetable or fruit</p>	 <p>c. One more slice of bread</p>	 <p>d. A meat substitute</p>
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11. How many servings from the bread and cereal group should you eat each day?

<p>5</p> <p>a.</p>	<p>4</p> <p>b.</p>	<p>2</p> <p>c.</p>	<p>3</p> <p>d.</p>
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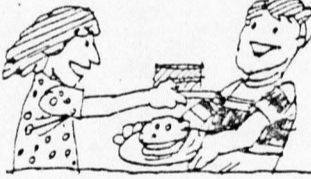

12. Which food belongs in the meat group?

 <p>a. Corn</p>	 <p>b. Pancakes</p>	 <p>c. Gravy</p>	 <p>d. Nuts</p>
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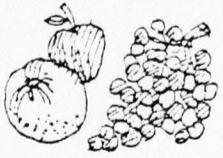

13. When does your body use the most food?

 <p>a. When you sleep</p>	 <p>b. When you run</p>	 <p>c. When you study</p>	 <p>d. When you walk</p>
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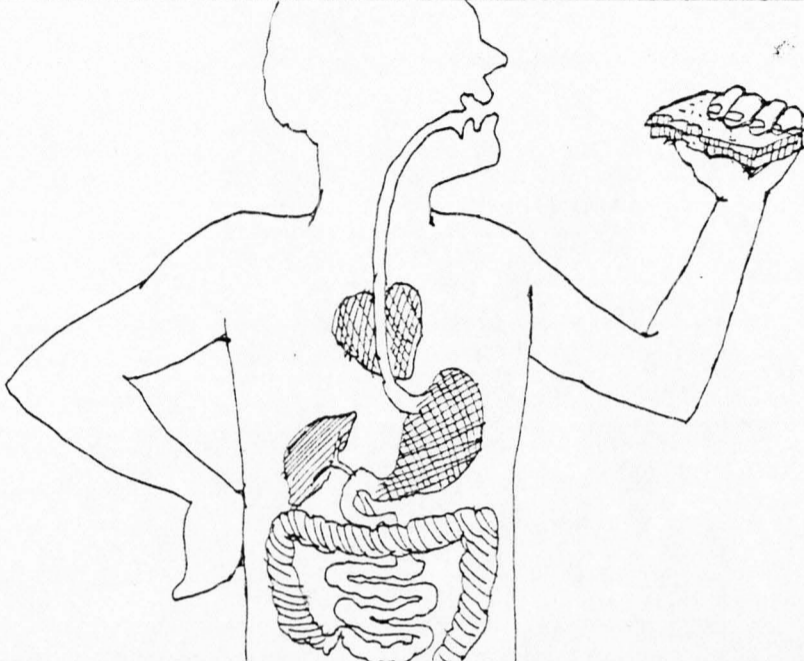
14. What should you do when you eat in the school lunch area?

 <p>a. Eat only your favorite foods.</p>	 <p>b. Use good manners.</p>	 <p>c. Trade food with your friend.</p>	 <p>d. Drink your milk first.</p>
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15. What food is best to have at parties?

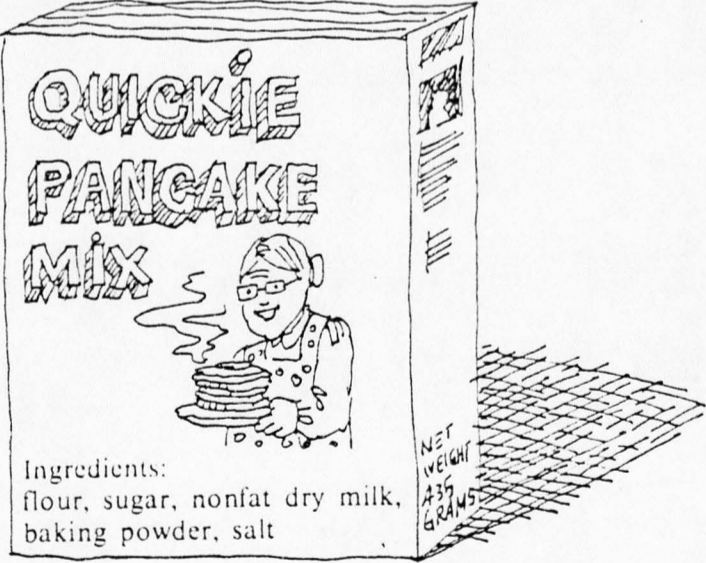
 <p>a. Peanut-chocolate bars</p>	 <p>b. Popsicles</p>	 <p>c. Fresh fruit</p>	 <p>d. Soda pop</p>
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16. After chewing food in your mouth, where does it go next?







a. To your heart	b. To your liver	c. To your stomach	d. To your intestine
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17. What is the main ingredient in this box of pancake mix?



a. Milk	b. Baking powder	c. Sugar	d. Flour
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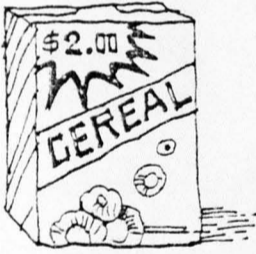


18. Which person tells us most about foods that help us have healthy teeth?

			
a. Doctor	b. Toothpaste salesperson	c. Dentist	d. Cook



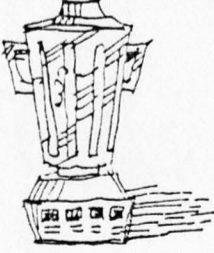

19. How many servings should you eat each day from the fruit and vegetable group?

<p style="text-align: center; font-size: 2em;">5</p> <p style="text-align: center;">a.</p>	<p style="text-align: center; font-size: 2em;">4</p> <p style="text-align: center;">b.</p>	<p style="text-align: center; font-size: 2em;">2</p> <p style="text-align: center;">c.</p>	<p style="text-align: center; font-size: 2em;">3</p> <p style="text-align: center;">d.</p>
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20. How do cereal companies try to get children to buy their cereal?

			
a. They put free gifts in the box.	b. They tell you how much the cereal costs.	c. They tell you bad things about the cereal.	d. They tell you what the cereal is made of.

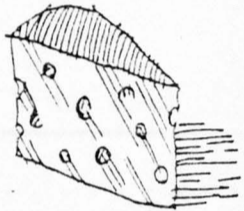

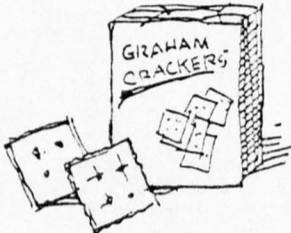

21. What is one way to cook food?

			
a. Mash it.	b. Steam it.	c. Blend it.	d. Chop it.

22. What can happen to you if you eat more food than your body needs?

 <p>a. Become thirsty.</p>	 <p>b. Become overweight.</p>	 <p>c. Become underweight.</p>	 <p>d. Become hungry.</p>
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23. Which food will help keep your teeth healthy?

 <p>a. Cheese</p>	 <p>b. Sugar</p>	 <p>c. Graham crackers</p>	 <p>d. Honey</p>
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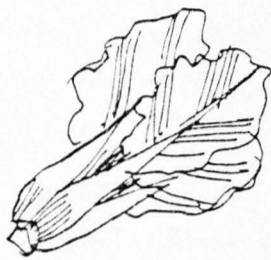


24. What should the lunch area be like when you eat?

<p>Busy</p> <p>a.</p>	<p>Clean</p> <p>b.</p>	<p>New</p> <p>c.</p>	<p>Crowded</p> <p>d.</p>
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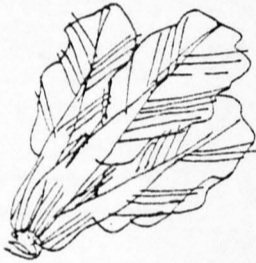


25. How can you help your school to waste less food?

 <p>a. Eat the same foods every day.</p>	 <p>b. Help plan the school lunch</p>	 <p>c. Trade food with your friend.</p>	 <p>d. Put the food in the trash can.</p>
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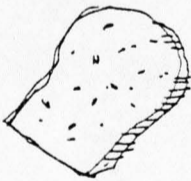

26. What kind of food is a turnip?

 <p>a. Fruit</p>	 <p>b. Vegetable</p>	 <p>c. Grain</p>	 <p>d. Seed</p>
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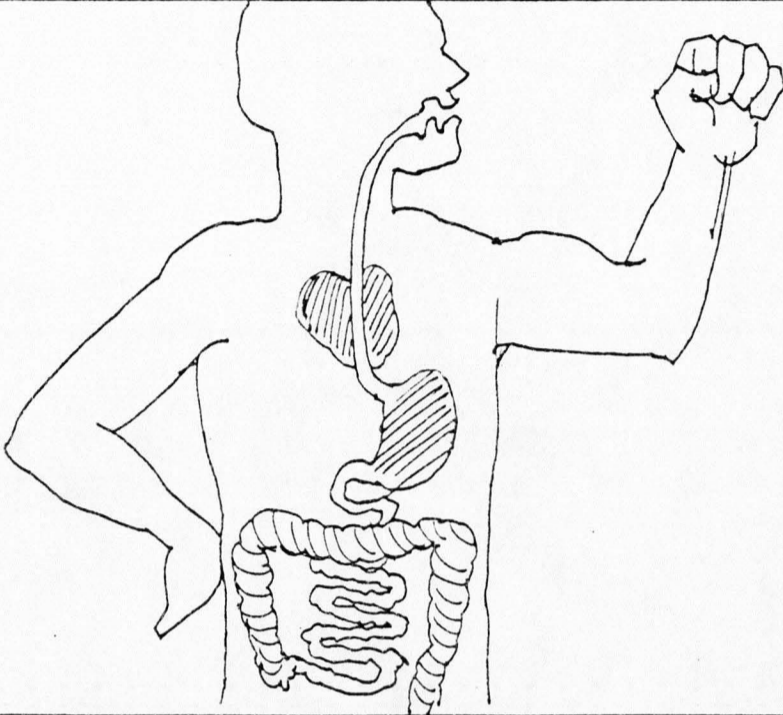
27. What kind of food is an avocado?

 <p>a. Fruit</p>	 <p>b. Vegetable</p>	 <p>c. Grain</p>	 <p>d. Seed</p>
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28. Your school meal pattern lunch has meat, one fruit, one vegetable, one slice of bread, and ice cream. What is missing?

 <p>a. A dessert</p>	 <p>b. One more vegetable</p>	 <p>c. One more slice of bread</p>	 <p>d. A cup of milk</p>
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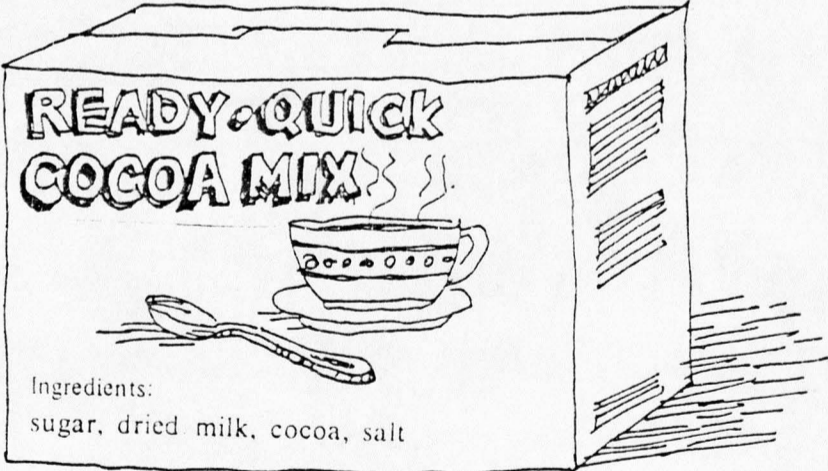
29. After food leaves your stomach, where does it go next?



The diagram shows a human torso with the digestive system highlighted. The esophagus leads from the mouth to the stomach. The small intestine is shown as a long, coiled tube. The large intestine is shown as a larger, more segmented tube. The heart is also visible in the chest area.

a. To your heart	b. To your small intestine	c. To your muscles	d. To your large intestine
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30. What is the main ingredient in this box of cocoa mix?





The illustration shows a rectangular box of 'READY-QUICK COCOA MIX'. The text on the box is in a bold, stylized font. Below the text is a drawing of a cup of cocoa on a saucer with a spoon. The ingredients are listed as 'sugar, dried milk, cocoa, salt'.





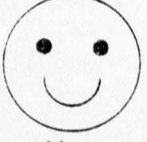




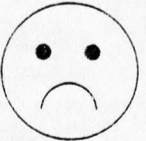
a. Dried milk	b. Cocoa	c. Sugar	d. Salt
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APPENDIX P
AFFECTIVE POSTTEST - GRADES TWO AND THREE



NUTRITION EDUCATION ASSESSMENT
PART II
NUTRITION ATTITUDE QUESTIONNAIRE
Grades Two and Three



<p>PRACTICE QUESTION SWIMMING IS MORE FUN THAN READING.</p>	 YES	 NO
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1-3-A



31. DURING COOKING TIME AT SCHOOL, I WILL TRY NEW FOODS IF MY FRIENDS TRY THEM TOO.	 YES	 NO
32. I WOULD EAT FOOD THAT HAS BEEN DROPPED ON THE FLOOR.	 YES	 NO
33. WHEN I AM ANGRY IT IS HARD FOR ME TO EAT.	 YES	 NO
34. I KNOW FOODS I SEE ON TV ARE GOOD FOR ME.	 YES	 NO
35. I WOULD NOT EAT A NEW FOOD EVEN IF MY FRIENDS LAUGHED AT ME.	 YES	 NO



36. IF GIVEN MY CHOICE BETWEEN CAKE AND FRUIT, I WOULD USUALLY CHOOSE THE CAKE.	 YES	 NO
37. I EAT ONLY FOODS THAT TASTE GOOD TO ME.	 YES	 NO
38. FOODS THAT COST MORE ARE BETTER FOR ME.	 YES	 NO
39. I WOULD TASTE A NEW FOOD IF MY FRIEND TASTED IT FIRST.	 YES	 NO
40. I EAT FOODS ONLY IF THEY ARE GOOD FOR ME.	 YES	 NO





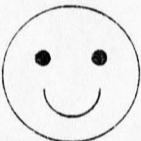





41. I LIKE THE FOOD ON MY PLATE TO BE OF DIFFERENT COLORS.	 YES	 NO
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42. I LIKE FOODS THAT COME IN PRETTY BOXES.	 YES	 NO
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43. I WILL EAT SOME FOODS EVEN IF MY FRIEND SAYS I SHOULDN'T.	 YES	 NO
---	--	---

44. IF I FEEL GOOD, I CAN EAT ANYTHING I WANT.	 YES	 NO
--	--	---

45. I EAT ONLY FOODS THAT LOOK GOOD TO ME.	 YES	 NO
--	--	---

46. I ASK FOR FOOD I SEE ON TELEVISION.	 YES	 NO
47. WHEN MY FRIENDS EAT VEGETABLES IN THE CAFETERIA, I WILL EAT VEGETABLES TOO.	 YES	 NO
48. I USUALLY WASH MY HANDS BEFORE I EAT.	 YES	 NO
49. I EAT ONLY THE FOODS THAT I LIKE ON MY PLATE.	 YES	 NO
50. THE BEST FOODS FOR SNACKING ARE THE ONES I SEE ON TV.	 YES	 NO

APPENDIX Q

NUTRITION POSTTEST FOR PARTICIPATING TEACHERS

Instructions: Mark the letter corresponding to the correct answer on the answer sheet. Use "A" for True and "B" for False.

1. Which of the following foods is not in the milk group?
 - a. ice cream
 - b. yogurt
 - c. acidophilus milk
 - d. eggs
2. Which of the following is not in the meat group?
 - a. peanuts
 - b. fresh lima beans
 - c. eggs
3. The number of servings of milk required for school-age children daily is:
 - a. 2 cups
 - b. 3 cups
 - c. 4 cups
 - d. 1 cup
4. The amount of cheddar cheese which is equivalent to 1 cup milk, based on calcium content, is:
 - a. $\frac{1}{2}$ ounce
 - b. 1 ounce
 - c. $1\frac{1}{2}$ ounces
 - d. 2 ounces
5. Which of the following foods is not equivalent to 1 ounce meat by protein content?
 - a. $\frac{1}{2}$ cup cooked, dried peas
 - b. 1 egg
 - c. 1 T. peanut butter
6. Which of the following foods is not a good source of vitamin C?
 - a. lettuce
 - b. oranges
 - c. grapefruit
 - d. cantelope
7. The daily requirement for milk for adults may be satisfied by:
 - a. 2 cups yogurt
 - b. 2 cups cottage cheese
 - c. 2 cups ice cream
 - d. none of these

8. Which of the following foods is not rich in vitamin A?
- a. broccoli
 - b. apple
 - c. acorn squash
 - d. apricots
9. According to the Four Food Group Plan, corn is a:
- a. vegetable
 - b. bread
 - c. cereal
 - d. meat
10. Table sugar is:
- a. maltose
 - b. sucrose
 - c. fructose
 - d. lactose
11. A fat which is liquid at room temperature is:
- a. polyunsaturated
 - b. an oil
 - c. from a vegetable
 - d. a, b, and c
12. Nutrition labeling is required when:
- a. food crosses state lines
 - b. a nutritional claim is made about the food
 - c. the food is fortified with added nutrients
 - d. a, b, and c
 - e. b and c only
13. Triglycerides are composed of:
- a. 3 glycerols and 1 fatty acid
 - b. 3 glycerols and 3 fatty acids
 - c. 1 glycerol and cholesterol
 - d. cholesterol
14. The total approximate number of nutrients which we know are in food is:
- a. six
 - b. ten
 - c. 20
 - d. 55
15. An example of hydrogenated fat is:
- a. corn oil
 - b. margarine
 - c. safflower oil
 - d. peanut oil
16. The process of hydrogenation converts:
- a. a solid fat to a liquid oil
 - b. a liquid oil to a solid fat
 - c. a fresh food to a preserved food
 - d. none of these

17. A compound that is not a nutrient is:
- a. fat
 - b. calcium
 - c. carbon
 - d. water
18. Sucrose is a combination of:
- a. glucose + galactose
 - b. 2 parts glucose
 - c. glucose + fructose
 - d. fructose + galactose
19. Excessive intake of the following can increase body weight:
- a. protein
 - b. carbohydrate
 - c. fat
 - d. all of these
20. Carrots are an example of a plant:
- a. stem
 - b. root
 - c. leaf
 - d. flower
21. Cabbage is an example of a plant:
- a. stem
 - b. root
 - c. leaf
 - d. flower
22. Wheat is a:
- a. fruit
 - b. vegetable
 - c. grain
 - d. stem
23. Adding nutrients to a food which were not previously there is:
- a. enrichment
 - b. fortification
 - c. processing
 - d. hydrogenation
24. Tofu is in which food group?
- a. meat (protein)
 - b. milk
 - c. bread-cereal
 - d. fruit-vegetable
25. Tortillas are from which food group?
- a. meat
 - b. milk
 - c. bread-cereal
 - d. fruit-vegetable
26. Macaroni is from which food group?
- a. meat
 - b. milk
 - c. bread-cereal
 - d. fruit-vegetable

27. Alfalfa sprouts are from which food group?
- a. meat
 - b. milk
 - c. bread-cereal
 - d. fruit-vegetable
28. The Dietary Goals recommend all of the following except:
- a. increase consumption of complex carbohydrate
 - b. reduce cholesterol consumption
 - c. increase saturated fat consumption
 - d. limit salt consumption
29. Food rancidity is prevented by use of:
- a. BHA
 - b. BHT
 - c. vitamin E
 - d. all of these

True-False

30. Energy from food is measured in calories.
31. Excess glucose may be stored as glycogen.
32. Fat contains more than twice as many calories per ounce than protein.
33. Milk foods are low in iron and vitamin C.
34. All nutrients listed on the RDA chart must be listed on a nutrition label.
35. A list of ingredients in a product is listed in alphabetical order.
36. An adequate dietary protein can be obtained by combining beans and rice.
37. The two major sources of food are plants and animals.
38. Honey is used by the body in the same way sugar is.
39. Vitamins may be food additives.
40. The agency which regulates food labeling is FTC.

APPENDIX R

ANALYSIS OF VARIANCE FOR COGNITIVE PRETESTS

Kindergarten Tests

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Significance</u>
Between groups	2	2.06	.39	NS
Within groups	106	5.26		
Total	108			

Grade One-Three Test

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Significance</u>
Between groups	2	4.97	.7199	NS
Within groups	283	6.90		
Total	285			

APPENDIX S

ANALYSIS OF VARIANCE FOR KINDERGARTEN POSTTEST

Source	df	MS	F	Significance
Main effects	3	22.99	4.516	.05
School	2	21.63	4.25	.01
Precog. (Covariate)	1	28.34	5.57	.02
Explained	3	22.99	4.52	.01
Residual	86	5.09		
Total	89			

APPENDIX T

ANALYSIS OF VARIANCE, GRADE ONE-THREE, POSTCOGNITIVE
SCORES WITH THE PRECOGNITIVE SCORE
AS THE COVARIATE

Source	df	MS	F	Significance
Main effects	5	92.70	11.38	.05
School	2	36.70	4.50	.05
Grade	2	7.75	.95	NS
Precog. (Covariate)	1	239.32	29.38	.05
Interaction	4	23.08	2.83	.05
Explained	9	61.76	7.58	.00
Residual	215	8.147		
Total	224	10.30		

Covariate Raw Regression Coefficient
Precog. 0.448

APPENDIX U

ANALYSIS OF VARIANCE FOR COGNITIVE POSTTEST BY SCHOOL

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>F Probability</u>
Between groups	2	396.34	3.516	.031
Within groups	259	112.72		
Total	261			

APPENDIX V

ANALYSIS OF VARIANCE FOR AFFECTIVE PRETEST

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>Significance</u>
Between groups	2	1.95	1.04	.354 NS
Within groups	219	1.87		
Total	221			

APPENDIX W

ANALYSIS OF VARIANCE FOR AFFECTIVE POSTTESTS

Source	df	MS	F	Significance
Main effects	4	19.47	4.21	.05
School	2	22.60	4.89	.05
Grade	1	13.65	2.95	NS
Pretest (Covariate)	1	29.64	6.42	.05
Interaction	1	2.06	.45	NS
School Grade				
Explained	6	13.66	2.96	.005
Residual	161	4.62		
Total	167	4.94		

Covariate Raw Regression Coefficient
 Pre-AFF 0.263

VITA

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Education and Training

- 1962 BS (Dietetics), Immaculate Heart College, Los Angeles
Minors in Psychology and Chemistry
- 1965 MPH (Nutrition), University of California, Los Angeles
Internship: Requirements completed through masters degree
Other: Standard Teaching Credential (Life), State of California

Experience in Community Nutrition

- 1979-1980 Project Director, Nutrition Education and Training Program, Chico Unified School District/CSU, Chico
- 1978 Nutrition Consultant, Chico Unified School District
- 1976 Nutrition Consultant, Superior California Senior Services Inc. (Title VII)
- 1975 Nutrition Consultant, Far Northern and Alta California Regional Centers
- 1974-1975 Nutrition Consultant, Indian Health Services
Responsibilities included developing and implementing nutrition components for ongoing health and community programs including WIC, Headstart, Title VII and School Lunch, on western Washington reservations
- 1973-1974 Nutrition Consultant, DHEW Region X, Migrant Health Program
Responsibilities included developing and coordinating nutrition education in Migrant Health Project areas through the region (Washington, Oregon, and Idaho)

- 1971-1975 Community Nutrition Consultant, Olympic Health District, Port Angeles, Washington
Services included developing and performing nutrition components of health services including counseling, Title VII, WIC, Family Planning, and Headstart.

Experience in Higher Education

- 1976-1980 Assistant Professor, Foods and Nutrition
California State University, Chico
- 1971-1975 Instructor, Foods and Nutrition and
Coordinator, Dietetic Assistant Program
Peninsula College, Port Angeles, Washington
- 1969-1970 Assistant Professor, Foods and Nutrition
California State Polytechnic University, Kellogg Campus
Pomona, California
- 1965-1969 Instructor, Foods and Nutrition
El Camino College, Torrance, California

Clinical Experience

- 1971-1975 Dietary Consultant for hospitals and nursing homes
Callam County, Washington
- 1972-1973 Clinical Dietitian, Olympic Memorial Hospital
Port Angeles, Washington
- 1969-1970 Dietary Consultant for various southern California con-
tinuing care facilities

Professional Activities

Member, American Dietetic Association, California Dietetic Association, Golden Empire District Dietetics Association
Registered Dietitian (R.D.) No. R-301088

California Dietetics Association, Golden Empire District
Representative to Area I HSA (Health Systems Agency), 1977-Present

Community Nutrition Section Chairperson, 1973-1975
Washington State Dietetic Association

Member of Society for Nutrition Education
- Nutrition Today Society
- Iota Sigma Pi (Honorary for Women in Chemistry)

President, Olympic Peninsula Home Economics Association, 1973-1974

Professional Activities (Continued)

Program Chairman and President-Elect, 1969-1970
San Gabriel Valley Dietetics Association

Greater Los Angeles Nutrition Council
Board Member and Secretary, 1964-1970