EFFECTS OF NUTRITION EDUCATION ON DIETARY HABITS AND NUTRITION KNOWLEDGE IN ELEMENTARY SCHOOL CHILDREN

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We hereby recommend that the Thesis prepared under our supervision by Lisa Catherine Gilligan entitled Effects of Nutrition Education on Dietary Habits and Nutrition Knowledge in Elementary School Children

be accepted as fulfilling this part of the requirements for the Degree of Master of Science.

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INTRODUCTION

There is an increasing awareness that some of the major nutritional health problems affecting our adult population are due to the direct or indirect consequences of dietary habits formulated in early childhood.

Obesity and coronary heart disease are just two of the many examples of nutritional health problems often due to overeating and/or poor selection of foods. Research has shown that the treatment of obesity has been relatively unsuccessful. The high and increasing prevalence of obesity clearly indicates that a serious effort should be made to prevent the development of this disease; this effort should concentrate on the early years of life.

One of the basic needs for personal well-being is good nutrition. Nutrition education is very important in helping the child to learn to select nutritious foods. The child has a right to know what to eat and to know why and how his diet affects his health. One of the recommendations of the 1969 White House Conference on Food, Nutrition, and Health was that a comprehensive and sequential program of nutrition education be included as an integral part of the curriculum of every school (1). A survey conducted in 1975 (2) found

that only ten states had a legislative policy concerning nutrition in public schools. Other states were concurrently involved in federally funded projects ranging from the development of comprehensive nutrition programs for sample school districts to formulating policies on the direction nutrition education would take within certain states. Frequently states indicated some nutrition education was being carried out. States without specific nutrition policies often replied that nutrition was being covered in other subjects such as health and home economics. This survey indicated that administrative placement of nutrition education varies as does the education format for the inclusion of nutrition into public school curricula.

Nutrition education should begin at a very early age when children are formulating their everyday food habits. Langworthy, In 1913, stated his philosophy as the following: "A well nourished mind is impossible in a poorly nourished body and physical health is essential to the full mental and moral development of our children" (3). Deprivation of food, over-indulgence in food, or the lack of a balanced, nutritionally sound diet can all have an adverse effect on one's mental and physical health (4). It is important to improve children's eating habits and to make them more aware of good nutrition practices. The purpose of this study was to teach

elementary school children basic nutrition principles and good dietary habits with the intent that proper food selection will become part of their daily practice.

Studies have indicated that there is an obvious need for nutrition education in the elementary schools. Frank, Voors, Schilling, and Bereson (5) found that, in rural school children, protein intake was above the recommended level of the RDA's and that the sources of animal fat contributed more protein and fat to their diet than did sources of vegetable fat. However, sucrose almost equalled the total starch intake in many cases. Snacks contributed more calories to the total daily intake than did breakfast. There was also heavy reliance on vending machines. These findings indicate an obvious need for nutrition education of elementary school children.

Chopra, Forbes, and Habicht (6) in March of 1978 reported that most Americans receive liberal amounts of protein in their daily diet, well above the recommended daily allowance. Animal sources now provide over two-thirds of our protein, compared with early in the century when protein was supplied about equally by animal and vegetable sources.

In the past, diet-related diseases were always linked to deficiencies. Today, however, the population seems to

face contradictory diet-disease problems. While some people suffer from inadequate amounts of certain nutrients, others suffer from diseases brought on by the overconsumption of food in general, particularly foods high in fat, salt, and sugar (7).

According to a study done by Faye, Woodland, and Grant (8) on the eating habits of fifth graders, it was found that before nutrition education, many of the children's lunches were considered inadequate because only 15% contained a vegetable other than potatoes and only 30% contained a fruit; however, during the nutrition education instruction, 39% of the lunches contained a vegetable and 35% contained a fruit. Alfred and Tibbets (9) also found that after nutrition education, vegetable consumption increased significantly. These studies support the assumption that nutrition education is beneficial and aids the school child in choosing nutritious foods and in establishing good dietary habits.

Living a normal, healthy, and active life is of importance to every individual. However, in order to maintain and promote health, it is necessary that good dietary habits are established and that basic nutrition principles are understood early in life. Only then can intelligent food selections be made, day by day, throughout life.

STATEMENT OF THE PROBLEM

The need for nutrition education among all age groups is known. Since food habits are formed early in life, the greatest impact in promoting sound nutritional practices can be made during a child's formative years, kindergarten through twelth grade (10). Surveys have clearly indicated that typical meal habits of school-age boys and girls are far from satisfactory, with intakes of certain nutrients short of the amounts recommended for good nutrition. Furthermore, diets tend to worsen rather than improve as children continue through the grades into high school (11). If this trend is to be reversed, some means must obviously be found whereby all children receive guidance in building good food habits (12).

Learning to choose nutritious foods is an essential aspect of a child's education. Children do not instinctively choose the foods they need for good nutrition. Each child must learn that certain foods have a special importance for health and development, and that regularly choosing combinations of such foods is necessary for optimal health. If nutrition education was taught in

elementary school, would this education significantly improve the dietary habits and nutrition knowledge of these children?

HISTORICAL PERSPECTIVE

> Satisfactory textbooks on food and nutrition are not available ... Teachers depend on Department publications to supply their place. There is a demand for more nutrition publications, both technical and popular ... Simple leaflets are needed for instruction in primary grades and charts showing in graphic form results of nutritional investigations are very often requested (13).

References are frequently made stating that nutrition education within present day elementary school programs is something new and different; however, the above quotation indicates that teachers were requesting nutrition education materials as early as 1905. The National Dairy Council is one of the major forerunners in nutrition education. Since 1915, the National Dairy Council, with their programs directed toward children and adults, have immeasureably influenced the history of nutrition education.

In 1908, the first nutriton class was conducted in Boston by W.R.P. Emerson (13). However, in a strict sense, his classes were not satisfactory for a nutrition education program for children. These classes were developed for underweight children only and were conducted in a clinical situation. Although Emerson's nutrition education program was not appropriate for all children, it did cause

educators to examine the possibilities of nutrition education through health education programs.

Lydia J. Roberts who, in 1918 worked with the "individual method" and the "class method" is honored as being the most distinguished pioneer in nutrition education programs for children. Mary Harper, a Nutritionist for the New York Association for improving the Conditions of the Poor, and Mary Swartz Rose of Columbia University were also pioneers in the historical development of nutrition education programs (13).

During the 1920's nutrition education programs for children were beginning to center in schools. Roberts (from Chicago) recognized that nutrition education could be done more effectively in a school situation than in a clinical one; almost every child could be reached in public schools. During this decade and continuing for 25 years, Roberts in Chicago, and Rose in New York worked independently developing nutrition education programs for children and training hundreds of workers in both nutrition and nutrition education. The aim of their nutrition education programs was to establish and maintain desirable food habits (13). Today, this goal still exists for all nutrition education programs. This education is carried to effective completion

only when students put into daily practice good, sound, nutritional habits.

Many studies have been performed that intend to show that nutrition education will improve dietary habits and will increase the student's knowledge and understanding of basic nutrition principles. In 1950 (8) Faye, Woodland, and Grant found that after teaching fifth graders how to plan a good lunch, there was a significant increase in the number of students eating an adequate lunch during the time they were being instructed and five weeks later.

Hunt, Patton, and Carver (14) in 1958 designed a program to improve vegetable acceptance among fourth graders who participated in the School Lunch Program. These children participated in vegetable tasting parties and then subsequently were served these vegetables in the school lunch. By measuring plate waste, it was found that educational efforts led to an increase in student's acceptance of vegetables. In a later study by Alford and Tibbets (9), in 1971, it was found that through a nutrition education program, vegetable consumption increased significantly in the experimental group taught nutrition.

Gassie and Jones (15), in 1972, developed an eight week nutrition education program emphasizing the following topics:

1. The Basic Four
2. Vegetables in the Diet
3. Milk
4. Bread and Cereal
5. Meat
6. The Importance of Some Foods in the Morning
7. Between Meal Feedings
8. Putting it all Together

Following the eight weeks of nutrition education, significant changes in eating habits were observed in students and sustained for four months after the end of the program.

Baker's findings (16) in 1972 were contrary to the findings of Gassie and Jones. Baker designed a nutrition education program for fourth and fifth graders consisting of thirteen daily lessons (school days) with a class duration of thirty minutes. Follow up lessons were also included. However, no significant change in dietary habits were noted after this education program.

In 1973 Bell and Lamb (17) studied the effect of a six week instructional nutrition module in regard to dietary modification and cognitive learning of approximately 1500 fifth graders in 33 selected schools in 5 states. After six weeks of nutrition education it was found that the experimental group had a significantly higher posttest mean score than the control group ($p < 0.01$). The mean increase for the experimental group was 31% while the mean increase for the control group was only 8%. However, in this particular study

the dietary behavior was not as greatly modified as the cognitive learning; this indicates that we do not always do what is best for us.

In a later study done by Cooper and Philip (18) in 1974, it was found that students who were taught nutrition showed improvement in nutrition knowledge when compared to those students not being taught nutrition education ($p < 0.05$). Sixty-five percent of the experimental group were able to classify foods into their correct food group while only 39% of the control group were able to classify the foods correctly. Improvement was also found in the claimed eating behavior of the students taught nutrition.

An interesting study was done by Rappenthal (19) in 1977. Through the use of pre- and posttests and later retention tests, he found that children's eating habits and attitudes changed for the better during the first year of nutrition education.

Head (11) in 1974 had evaluated a nutrition education program at three grade levels. This was done by the following procedure:

1. Student's rating of school lunch food
2. Weight and nutrient content of plate waste
3. Performance on cognitive tests
4. Dietary recall

Results showed that fifth grade classes and one seventh grade class did significantly ($p < 0.05$) improve their

knowledge of nutrition as measured by cognitive tests. Three day dietary recalls showed that diets of seventh graders improved significantly after nutrition education. Plate waste from fifth graders decreased significantly after educational classes in nutrition. Acceptability ratings of school-served food increased among fifth graders more so than among the others. Overall, the amount of change decreased progressively at higher grade levels, indicating the importance of introducing nutrition education during the elementary school years.

Blakeway and Knickrehm (20) in 1978 studied the relationship of a change in dietary behavior in first, second, and third graders to a nutrition education program in terms of reduced plate waste in the school lunch. Results indicated that the experimental group ate more of nearly all items at all grade levels, although many of the increases were not statistically significant. Thus, the concerted nutrition effort did result in some improvement in food consumption, indicating that some of the children were learning to eat these foods as a result of their exposure to nutrition education.

As much of the literature indicates, by introducing nutrition education into the elementary schools, we will

be able to influence the dietary habits and nutrition knowledge of elementary school children.

HYPOTHESIS

The research hypothesis of this study is: There is a statistically significant difference in the dietary habits and nutrition knowledge between elementary school children who have been taught a nutrition education unit and the control group who has not been exposed to nutrition education.

The null hypothesis and the hypothesis that was tested is: There is no statistically significant difference in the dietary habits and in the nutrition knowledge between elementary school children who have been taught a nutrition education unit and the control group who has not been exposed to nutrition education. Changes in dietary habits and nutrition knowledge were assessed by plate waste studies and a nutrition knowledge test, respectively. A significant difference was accepted at a level of probability of 0.05 or less.

METHODS AND PROCEDURES

Sampling

Included in this study were two classes of students, comprising a total of 51 students, between the ages of five and nine from a Montessori Elementary School in a local school district. The sampling in this study was accidental, as the student's participation in the study was contingent on their being in a class that the school allowed to be involved in the study. These students were studied to determine their dietary practices and their nutrition knowledge. None of these students had previously been exposed to nutrition education.

One of the two classes selected to participate in this study was randomly chosen to serve as the experimental group. This group was made up of 27 students; the control group had a total of 24 students.

In order to obtain informed consent, a letter of explanation (appendix A) as well as a written consent form (appendix B) was administered to the parents of each student. These forms were signed by the parent or legal guardian before the child was able to participate in the study.

Instrumentation

Initially, all 51 students were grouped together and asked to eat a noon meal in the school cafeteria. Plates containing preportioned amounts of food from all four food groups as well as "empty" calorie foods were served to the students. A list of these foods, their portion size, and their nutrient composition (appendix C) have been determined. Each student was allowed to choose his own beverage, either coke or milk. The amount of food served on the plate, any seconds the student asked for, and the amount of beverage consumed were recorded (appendix D). After the student finished eating, the food wastage was weighed and subtracted from the original amount. The student's intake of food and drink was evaluated and compared to one-third of the RDA's specified for this age group (21).

The students were also tested on their nutrition knowledge prior to the nutrition education program. The Kuder-Richardson and Hoyt test (22) was used to determine the reliability of the nutrition knowledge test. After this pretest (appendix E) was given, one of the two classes was randomly chosen to serve as the experimental group.

The experimental group was taught eight, thirty-minute classes (appendix F). These classes were held twice a week for a total of four weeks. This group was taught basic

nutrition principles with emphasis placed on good eating practices, snacking, and the relationship between food and good health. At the conclusion of the nutrition education program, a posttest (the same as the pretest) was administered to both groups. All students once again participated in a plate waste study. The results from the nutrition knowledge test and from the plate waste study were compared in order to determine if there was a significant improvement between the experimental and the control groups, pre- and posttest, with regard to dietary practices and nutrition knowledge.

STATISTICAL ANALYSIS

An analysis of variance based on the design of this experiment - two factor mixed design with repeated measures on one factor was the statistic used on the test scores achieved by the experimental and the control groups. According to Bruning and Kintz (22) this design permits: 1) comparison of the overall performance of the experimental groups (as in the completely randomized design), 2) evaluation of performance changes from one measuring period to the next (as in the treatments-by-subjects design), and 3) evaluation of the experimental effects in relation to the passage of time between measuring periods. An F-test

for simple effects was used to determine which changes, those of the experimental group or those of the control group, were significant.

The t-test for a difference between a sample mean and the population mean was used to determine if there was a significant difference between the RDA's specified for this age group and the actual nutrient intake of the experimental and control groups.

A Pearson's product-moment correlation test was used to determine the relationship, if any, between nutrition knowledge and nutrient intake.

RESULTS AND DISCUSSION

An assessment of the student's knowledge of basic nutrition principles was performed by use of a nutrition knowledge test. This assessment instrument was used for both the pre- and posttests and was administered to the 27 students in the experimental group and to the 24 students in the control group. An analysis of variance (ANOVA) model-- two factor mixed design with repeated measures on one factor was used to determine the results from the nutrition knowledge test (appendix G).

Prior to the nutrition education unit, treatment of the data from the nutrition knowledge test showed that there was a significant difference ($p < 0.05$) in the means achieved by the experimental and control groups, indicating that the groups were not homogeneous. The control group achieved a mean score of 18.8 which was 2.6 points higher than the mean score of 16.2 achieved by the experimental group. However, posttest scores of the control group demonstrated a mean decrease of 1.7 points in comparison to their pretest scores.

Due to time commitments, a Kuder-Richardson and Hoyt test (22) was not performed until after the posttest was

given. Results from this test indicated a reliability coefficient of r = 0.68. Although this is an acceptable level, it is at the lower end of the scale for acceptance and may have contributed to the variation in scores.

The control group did have a significantly higher ($p < 0.05$) pretest mean score than that of the experimental group. However, following the nutrition education unit, the experimental group's posttest mean score was significantly higher ($p < 0.05$) than the posttest mean score achieved by the control group, indicating that nutrition education does significantly increase nutrition knowledge in elementary school children ($p < 0.05$).

The maximum number of points possible on the nutrition knowledge test was 31. Results from this test are presented in Table 1 and in Figure 1. The mean score for the experimental group was 18.8. The control group's scores ranged from 9 to 26; experimental group scores ranged from 6 to 22.

Following the nutrition education unit, the mean score achieved by the experimental group on the posttest increased to 23.1, an average increase of 6.9 points over their pretest scores. The F-test indicated that this mean difference was highly significant ($p < 0.01$). Seventy-five percent of the questions were answered correctly by the experimental group on the posttest. This was an increase of 23% over

TABLE 1. MEAN SCORES ACHIEVED ON THE NUTRITION KNOWLEDGE TEST BY THE EXPERIMENTAL AND CONTROL GROUPS BEFORE AND AFTER NUTRITION EDUCATION

	PRE-TEST	POST-TEST	MEAN DIFFERENCE
EXPERIMENTAL	16.2	23.1	6.9**
CONTROL	18.8	17.1	1.7

**Significant ($p < 0.01$)

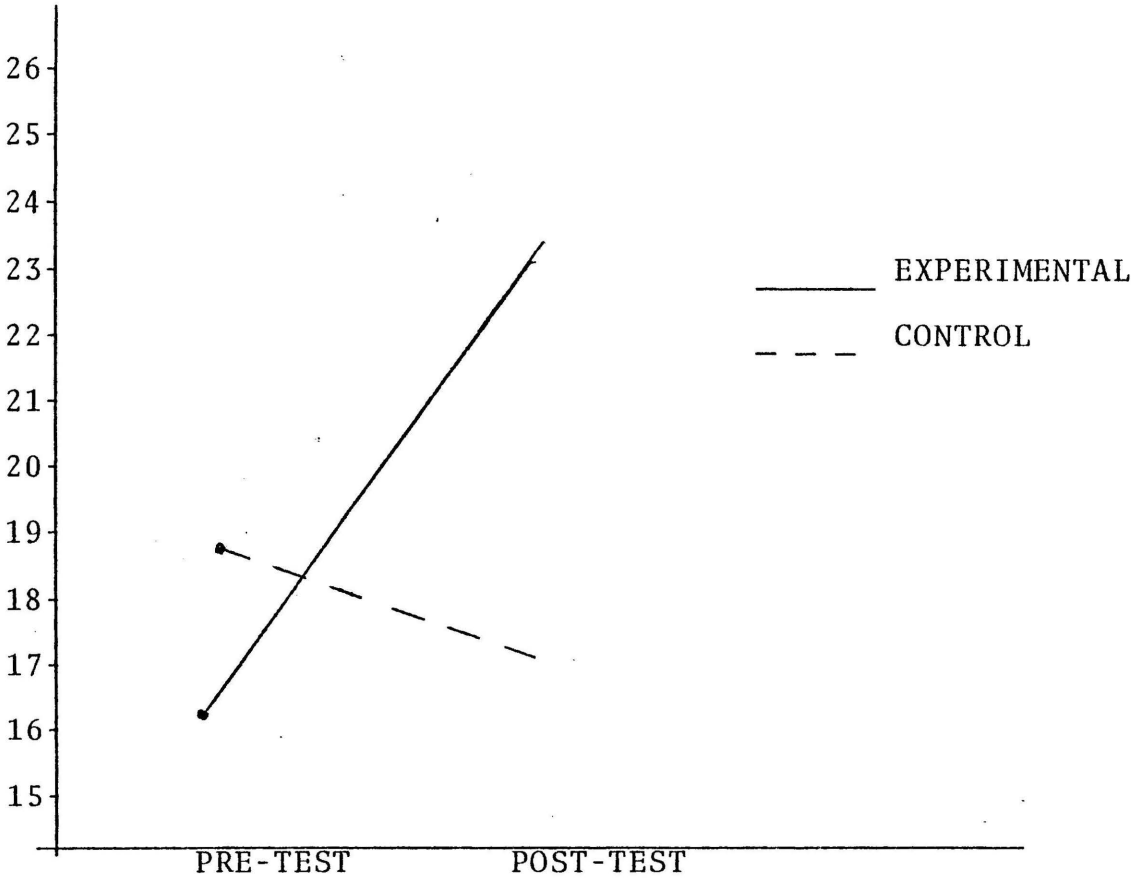


FIGURE 1. COMPARISON OF EXPERIMENTAL AND CONTROL GROUP SCORES ON THE PRE AND POST TESTS

their pretest scores. Posttest scores of the experimental group ranged from 14 to 28. Three students obtained a score of 28, indicating they had only 3 incorrect answers. Only 5 students obtained a score less than 20. In comparison, the control group's mean decreased to 17.1 on the posttest, an average decrease of 1.1 points from their pretest mean score. As expected, this mean difference was found to be nonsignificant, indicating that there was no change in the control group. Fifty-five percent of the questions were answered correctly; posttest scores ranged from 8 to 27.

In comparing the means of the posttest scores for the control and experimental groups, results indicated that the experimental group had 5.9 more correct responses than the control group. This difference was found to be significant ($p < 0.05$).

The nutrition knowledge test consisted of 5 sections constructed to reflect proficiency in 4 areas:

Section I - classifying foods into their correct food groups

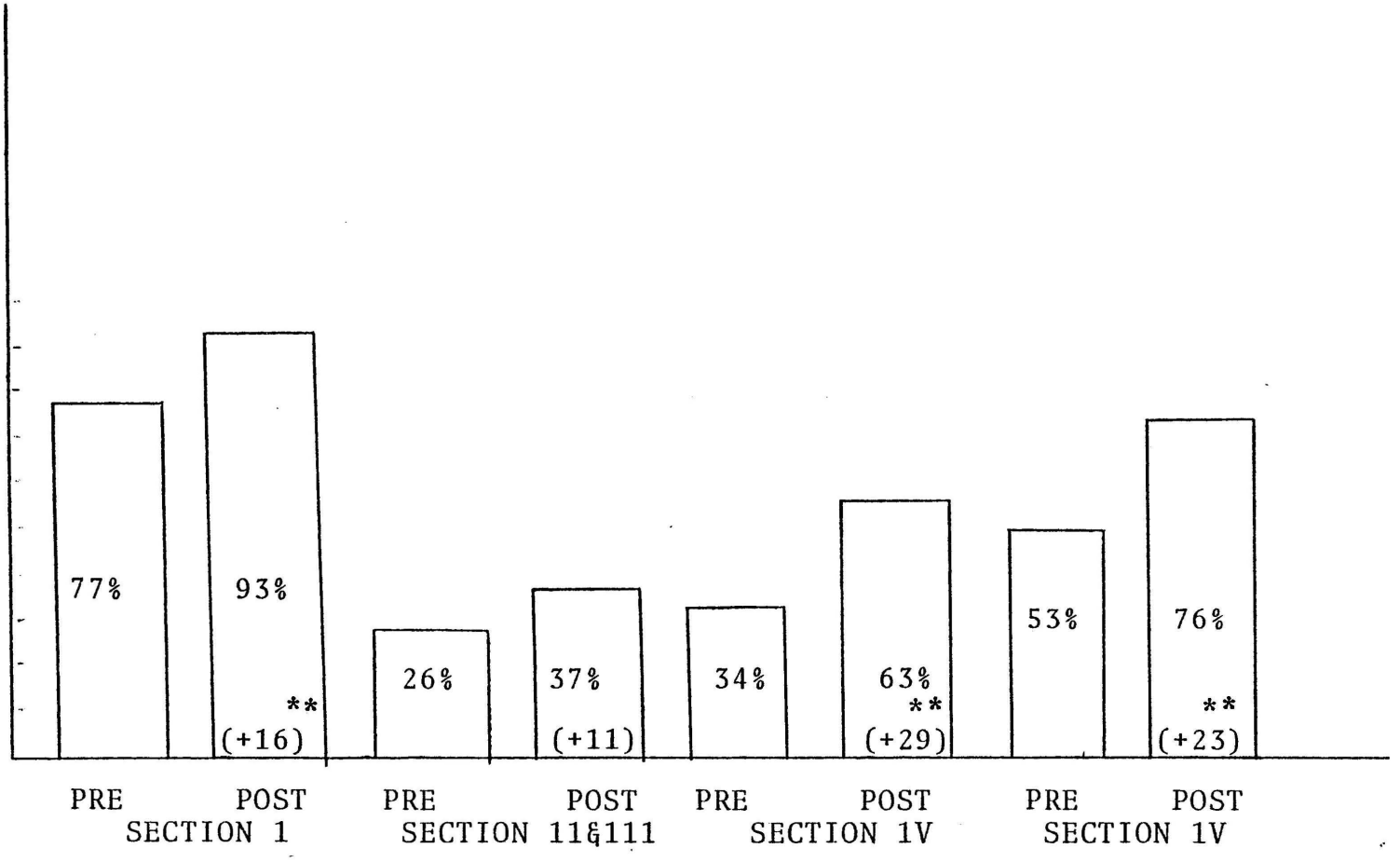
Section II- and III - selecting nutritiously adequate diets

Section IV- identifying major nutrients in foods

Section V - identifying the function of nutrients in our bodies

Table 2 indicates that there was an increase in the number

TABLE 2. COMPARISON OF NUTRITION KNOWLEDGE TEST SCORES IN THE EXPERIMENTAL GROUP BEFORE AND AFTER NUTRITION EDUCATION



**Significant at ($p < 0.01$)

of questions answered correctly by the experimental group on all sections of the posttest in comparison to their pretest scores. Significant improvements were achieved on all sections of the test except for sections II and III - selecting nutritiously adequate diets. However, the mean did increase for these two sections, indicating that there was some improvement, although it was not significant.

Section I consisted of 8 questions dealing with the classification of foods into their correct food groups. Ninety-three percent of these questions were answered correctly on the posttest, an average increase of 16% over the pretest scores. An average of 7.4 questions were answered correctly on the pretest. This 1.3 mean increase on the posttest was found to be highly significant ($p < 0.01$). Seventeen of the students in the experimental group achieved a perfect score of 8. Of the 10 students not achieving perfect scores, 8 of these students made the identical mistake of categorizing bread into the milk group.

Sections II and III consisted of 2 questions which measured the student's ability to choose a nutritiously adequate diet. Only 4 students in the experimental group correctly answered both questions. There was an 11% increase over the score achieved on the pretest; however, this difference was not significant ($p > 0.05$).

Section IV consisted of 8 questions which measured the student's ability to name the major nutrients found in certain foods. The student's answered an average of 5.1 questions correctly on the posttest. This was an average increase of 2.4 more correct answers over their pretest score of 2.7 correct answers. Sixty-three percent of the questions were answered correctly in comparison to the 34% of questions answered correctly on the pretest. This 29% increase in the mean score on the posttest was found to be highly significant ($p < 0.01$). Only 2 students achieved a perfect score on section IV. The most commonly missed question concerned the predominant nutrient contained in spinach. Twelve of the 27 students chose protein instead of Vitamin A as their correct response. Many of the students commented that Popeye ate spinach, giving him strong muscles and therefore making the assumption that spinach is high in protein.

Section V consisted of 15 questions, 13 of which were multiple choice questions dealing with the functions of nutrients in our body. A mean of 10.9 was achieved for the 13 multiple choice questions on the posttest, an increase of 2.9 points higher than the pretest scores. Eighty-four percent of the questions were answered correctly, a significantly high increase ($p < 0.01$) of 22% over pretest scores.

Question 14 and 15 in this section required written responses. The students were asked what they would want for supper if they were allowed to have anything and what they asked their mom and dad to bring them from the grocery store. Responses to what they wanted for supper from both the experimental and control groups prior to the nutrition education unit consisted of all basically nutritious foods including "Flamnyon rapt with bacun and baked btados with lots of butter" [sic]. (This is the phonetic spelling for Fillet Mignon wrapped with bacon and baked potatoes with lots of butter.) Only one student, from the control group, responded with a nonnutritious food, requesting popsicles. However, when asked what they would like their parents to bring them from the grocery store the responses were not generally as nutritious. Five students from the experimental group asked for nonnutritious snacks consisting of bubblegum, lemonade, cake, and a "starburst" candy bar. Five students from the control group also requested nonnutritious snacks including gum, popsicles, pop rocks (candy), and candy bars. However, both groups included fruits, sugarless candy and gum, eggs, pizza, milk, and steak in their responses. To the surprise of the investigator, one student even requested liver.

Following the nutrition education unit, all students in the experimental group requested nutritious dinners. Three students in the control group requested nonnutritious dinners including popsicles, ice cream, and coke. The students in the control group also requested that their parents bring many concentrated sweets from the grocery store such as pie, chocolate sundaes, soda water, Tic-Tacs, and popsicles. Other requests were for Doritos, and bubbles. One student in this group did request "health food" [sic].

In comparison, the experimental group, following the nutrition education program, all requested that nutritious foods be brought to them from the grocery store with the exception of one student who requested lemonade. Some of the requests from the experimental group were for fruits, sugarless gum, vegetables, low fat yogurt, cheese, ice-cream, pizza, and mushrooms. Three students requested toys.

Results from the nutrition knowledge test demonstrated that the experimental group, following a nutrition education program, did have a significantly higher mean test score than the control group. Therefore, that part of the null hypothesis, that "there is no significant difference in the nutrition knowledge between elementary school children who have been taught a nutrition education unit and

a control group who has not been exposed to nutrition education," must be rejected. The research hypothesis stating that "there is a statistically significant difference in the nutrition knowledge between elementary school children who have been taught a nutrition education unit and the control group who have not been exposed to nutrition education" was accepted.

Before and after the nutrition education unit, a basically nutritious meal with some "empty" calorie foods was served to both the experimental and control groups in order to determine if there was any change in the experimental group's dietary habits following the nutrition education program. No problems existed with absenteeism except for one student, from the control group, who was absent during the second feeding. Another student was hypoglycemic and although allowed to eat with the students participating in the study, he was to be omitted from the study. However, the student consumed all of the food, making no discriminations; therefore, he was included in the results.

During the first feeding, prior to the nutrition education program, there was no difference between the consumption of food in the experimental and control groups as indicated by the t-test. During the second feeding these consumption figures remained essentially the same for the

control group with the exception of oranges (Table 3). The amount of oranges eaten during the second feeding decreased significantly in comparison to the first feeding. There was also a significant decrease in the consumption of oranges by the experimental group during the second feeding ($p < 0.05$). This may have been due to the fact that the oranges were smaller and not as appealing as they had been for the first feeding, therefore discouraging the students from eating them.

During the second feeding the consumption of milk increased significantly in the experimental group while the consumption of coke decreased significantly. Two different types of paper cups were used to serve the milk and the coke in order to accurately count the amount of each beverage consumed. Milk was arbitrarily put in riddle paper cups for the second feeding which may have been an influencing factor in choosing milk instead of coke. However, it can be noted from Table 3 that there was no significant increase in the amount of milk consumed by the control group, nor was there a significant decrease in the amount of coke consumed by the control group during the second feeding. These results indicate that the significant increase in milk consumption by the experimental group during the second feeding was probably due to the nutrition education unit.

TABLE 3. FOOD CONSUMPTION BY THE EXPERIMENTAL AND CONTROL GROUPS BEFORE AND AFTER THE NUTRITION EDUCATION UNIT

FOOD (one serving)	EXPERIMENTAL MEAN CONSUMPTION (#of servings) before	after	MEAN DIFF	CONTROL MEAN CONSUMPTION (# of servings) before	after	MEAN DIFF
Meat Loaf(2oz)	0.75	0.70	0.05	0.97	0.77	0.20
Grn Beans(62.5gm) w/Bacon	0.61	0.42	0.19	0.77	9.62	0.15
Carrot(30gm) Sticks	0.70	0.63	0.63	0.07	0.60	0.01
Roll(1ea.)	0.97	0.77	0.20	0.89	0.80	0.09
Milk(4oz)	0.33	1.4	1.07*	0.13	0.50	0.37
Coke(4oz)	2.3	0.80	1.5**	2.7	1.9	0.80
Cupk(1.75oz) w/Icing	0.81	0.67	0.14	0.87	0.70	0.17
Hershey(1.05oz) Bar	1.09	1.07	0.02	1.14	0.96	0.18
Orange(1ea.)	0.27	0.04	0.23*	0.45	0.09	0.36*
Apple(1ea.)	0.16	0.12	0.04	0.21	0.17	0.04

* Significant ($p < 0.05$), as indicated by the t-test
** Significant ($p < o.01$), as indicated by the t-test

Results from the first and second feedings indicate that there was an overall decrease in the amount of food consumed by both the experimental and control groups during the second feeding. This may be attributable to many factors. First, the children normally bring their own lunch and eat in the classroom. The first time the meal was served the students were excited about eating in the cafeteria and they enjoyed the novelty of a prepared meal. During the first feeding, the students who normally eat in the school cafeteria were sent to a nearby park to enjoy a picnic lunch, so the cafeteria was available at 12:15 P.M. for the students participating in the study. However, during the second feeding, the cafeteria was not available until 1:15 P.M. and the children were fed snacks of peanuts and raisins by the teachers prior to their lunch meal. The fact that the students were served the same meal for the second feeding may also have contributed to a decrease in the consumption of food.

A nutrient analysis for all of the foods offered to the students at the noon meal was calculated. Bowes and Church (23) was used to determine the nutrient composition of these foods. Following both feedings, each student's food consumption was recorded. The nutrient intake of each student was then assessed. The obtained values were then

compared to one-third of the RDA's determined for 7 year olds. These RDA values were obtained from the 1974 National Research Council - Food and Nutrition Board (21).

Tables 4 and 5 compare one-third of the RDA's with the dietary intake of nutrients by the experimental and control groups. Of the eight nutrients analyzed, the intake of protein was significantly higher in both the experimental and control groups, for both feedings, in comparison to the RDA for protein ($p < 0.05$). Figure 2 supports Chopra, Forbes, and Habichts' (6) findings that "most Americans receive liberal amounts of protein in their daily diet, well above the recommended allowance." The mean protein intake was well above the RDA requirements. Minimum and maximum values showed an extremely wide range; however, this variability was due to only a few students.

Table 4 demonstrates that during the second feeding the experimental group consumed a significantly higher amount of protein, vitamin A, and riboflavin than the RDA's for each of these nutrients ($p < 0.05$). However, the intake of both protein and vitamin A were significantly higher during the first feeding in comparison to the RDA's. Therefore, the only significant improvement among these three nutrients was in the intake of riboflavin. Figures from the first feeding show that the intake of calcium and thiamin were

TABLE 4. COMPARISON OF ONE-THIRD OF THE RDA'S WITH THE DIETARY INTAKE OF THE EXPERIMENTAL GROUP DURING THE FIRST AND SECOND FEEDING

NUTRIENTS	1/3 RDA	FIRST FEEDING		SECOND FEEDING	
		mean consumption	difference	mean consumption	difference
Kcal	800.0	765.0	35.0	669.0	131.0*
Protein(gm)	12.0	19.5	7.5*	21.8	9.8*
Calcium(mg)	267.0	209.0	58.0*	319.0	52.0
Iron(mg)	3.0	4.1	1.1*	3.2	0.2
Vit A(I.U.)	1100.0	3085.0	1985.0*	2828.0	1728.0*
Thiamin(mg)	0.4	0.27	0.13*	0.33	0.07
Ribofl.(mg)	0.4	0.42	0.04	0.56	0.16*
Niacin(mg)	5.0	3.9	1.1*	3.7	1.3*
Vit C(mg)	13.0	25.0	12.0	7.0	6.0

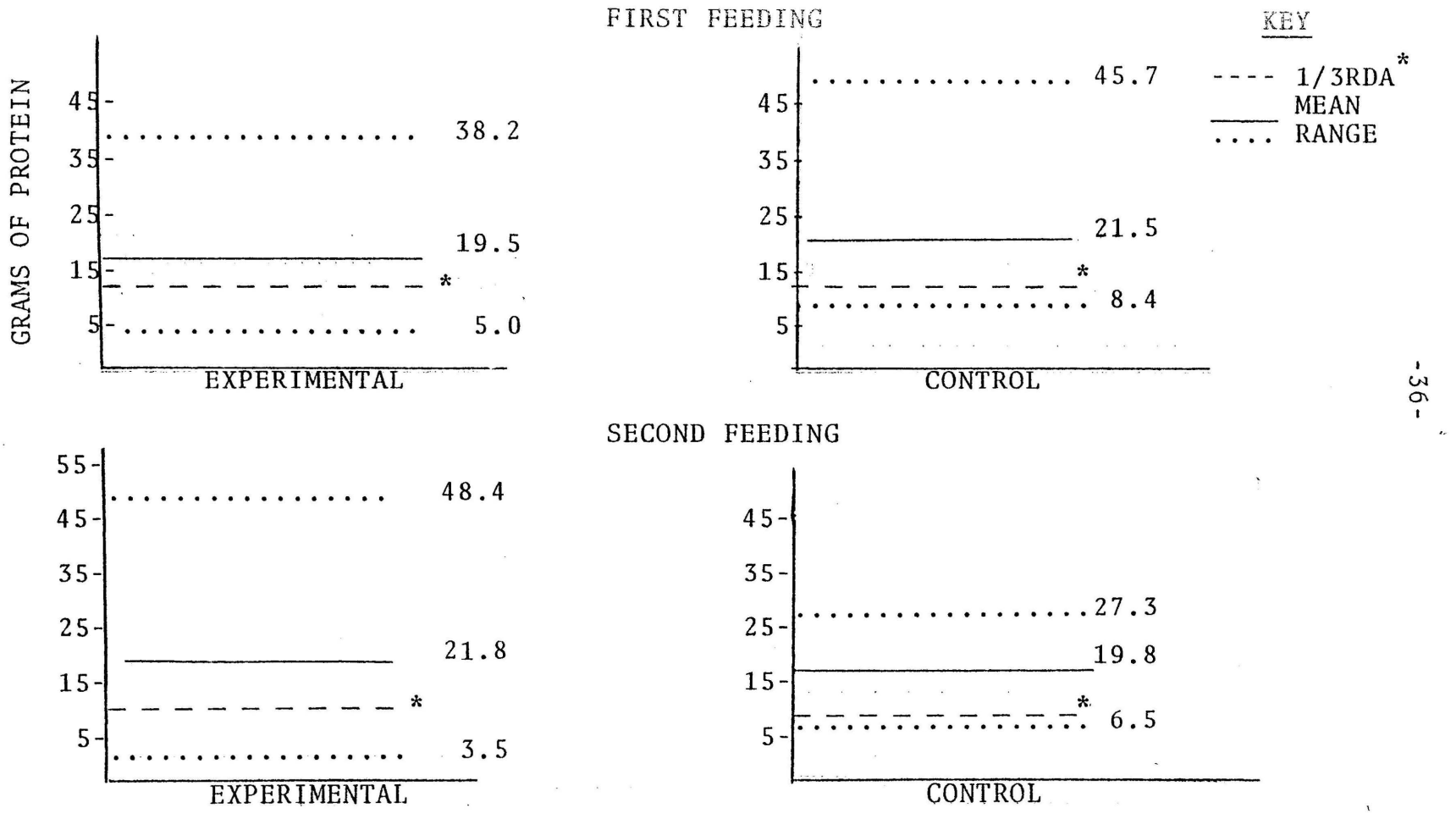
* Significant ($p < 0.05$), as indicated by the t-test

TABLE 5. COMPARISON OF ONE-THIRD OF THE RDA'S WITH THE DIETARY INTAKE OF THE CONTROL GROUP DURING THE FIRST AND SECOND FEEDING

NUTRIENTS	1/3 RDA	FIRST FEEDING		SECOND FEEDING	
		mean consumption	difference	mean consumption	difference
Kcal	800.0	793.0	7.0	678.0	122.0*
Protein(gm)	12.0	21.6	9.6*	19.7	7.7*
Calcium(mg)	267.0	187.0	80.0*	200.0	67.0*
Iron(mg)	3.0	4.4	1.4*	3.6	0.6*
Vit A(I.U.)	1100.0	2883.0	1783.0*	2645.0	1545.0*
Thiamin(mg)	0.4	0.29	0.11*	0.23	0.17*
Ribofl.(mg)	0.4	0.46	0.06	0.47	0.07
Niacin(mg)	5.0	4.6	0.4	4.1	0.9*
Vit C(mg)	13.0	31.0	18.0	8.0	5.0*

* Significant ($p < 0.05$), as indicated by the t-test

FIGURE 2. COMPARISON OF PROTEIN INTAKE DURING FIRST AND SECOND FEEDINGS



* 1/3 of the RDA = (12grams of protein)

significantly lower than the RDA's determined for these two nutrients. However, during the second feeding there was no significant difference between the intake of these nutrients and their associated RDA's. Therefore, this indicates that following the nutrition education unit, there was a significant increase in the intake of both calcium and thiamin. The increased intake of calcium, thiamin, and riboflavin in the experimental group during the second feeding was due mainly to the increased consumption of milk, following the nutrition education unit.

Tables 4 and 5 demonstrate that during the second feeding the amount of calories consumed by both the experimental and control groups was significantly lower than the RDA of 800 calories ($p < 0.05$). The intake of niacin and vitamin C also decreased during the second feeding for both groups; this decrease was due mostly to the decreased consumption of oranges during the second feeding. However, the nutrient intake of both niacin and vitamin C was significantly lower than the RDA's only for the control group.

Following each feeding, all student's diets were assessed to determine what percentage of the RDA's required for one meal (1/3 RDA) had been met. Frequency distribution information for the intakes of energy and the 8 nutrients is summarized in Table 6. These results indicate that the

TABLE 6. DISTRIBUTION OF NUTRIENT INTAKES BY THE EXPERIMENTAL AND CONTROL GROUPS IN RELATION TO ONE-THIRD OF THE RDA'S

GROUPS	Per Cent of Children								
	Kcal	Pro	Cal	Fe	Vit A.	Thia.	Rib.	Nia.	Vit C.
Experimental									
1st feeding									
above 1/3 RDA	44	74	33	70	82	11	48	22	33
2/3-100%	41	19	15	19	0	30	33	48	0
below 2/3	15	7	52	11	19	59	19	30	67
2nd feeding									
above 1/3 RDA	26	85	59	59	74	7	67	11	4
2/3-100%	48	7	7	22	0	52	15	52	4
below 2/3	26	7	33	19	26	41	19	37	92
Control									
1st feeding									
above 1/3 RDA	38	96	8	96	67	12	54	29	38
2/3-100%	58	0	38	4	0	42	42	63	0
below 2/3	4	4	54	0	33	46	4	8	62
2nd feeding									
above 1/3 RDA	13	96	35	70	70	0	48	13	13
2/3-100%	78	0	0	26	4	30	43	65	17
below 2/3	9	4	65	4	6	70	9	22	70

intake of protein was high in both groups for both feedings. Over 90% of the students met 2/3 or more of the protein allowance for one meal.

During the first feeding 48% of the students in the experimental group met 2/3 or more of the calcium requirements for one meal. During the second feeding this figure increased to 66%. In the control group, 46% of the students met 2/3 or more of the RDA for calcium for one meal. During the second feeding this figure dropped to 35%.

Riboflavin intakes in the experimental group followed a similar pattern as that of calcium. Forty-eight percent of the students met 1/3 of the RDA for riboflavin during the first feeding. During the second feeding this figure increased to 67%.

The percentage of students meeting 1/3 of the RDA for vitamin C was very low for both the experimental and control groups in both feedings. During the first feeding, 67% of the students in the experimental group and 62% of the students in the control group did not even meet 2/3 of the RDA for vitamin C for one meal. Results indicate that these figures increased during the second feeding. Ninety-two percent of the students in the experimental group and 70% of the students in the control group did not meet 2/3 of the RDA for vitamin C for one meal. These findings are in

accordance with Chopra, Forbes, and Habichts' (6) statement that "there is also the danger that fruits and vegetables will be crowded out of the diet, with the result that, although high in protein, it will be inadequate in other nutrients."

A Pearson's product-moment correlation test was used to determine the relationship between nutrition knowledge and nutrient intakes. Results (Table 7) indicate that there was a positive relationship only between protein ($r=0.48$) intake and nutrition knowledge ($p < 0.01$). This indicates that there is a strong relationship between nutrition knowledge and protein intake. However, as Table 4 demonstrates, the intake of protein by the experimental group was well above the RDA not only for the second feeding but also for the first feeding. It can be noted however, that the mean consumption of protein did increase to 21.8 grams of protein in comparison to the 19.5 grams of protein consumed during the first feeding. This increase in protein consumption, associated with an increase in milk consumption, during the second feeding and the correlation noted between protein intake and nutrition knowledge indicates that nutrition education does effect dietary habits in elementary school children.

As mentioned previously, there was a significant improvement in the intake of riboflavin, calcium, and

TABLE 7. RELATIONSHIP BETWEEN NUTRITION KNOWLEDGE AND NUTRIENT INTAKE OF THE EXPERIMENTAL GROUP FOLLOWING NUTRITION EDUCATION

variable	Pearson "r" values								
	energy (Kcal) intake	pro intake	cal intake	iron intake	vit A intake	thia intake	ribof1 intake	nia intake	vit C intake
nutrition knowledge	-0.30	0.48*	-0.05	-0.02	0.20	0.11	-0.08	0.32	0.07

* Significant ($p < 0.01$)

thiamin ($p < 0.05$) by the experimental group during the second feeding, in comparison to the first feeding, prior to the nutrition education unit. These significant improvements in nutrient intakes following nutrition education as well as the relationship exhibited between protein intake and nutrition knowledge, as indicated by the Pearson's product-moment correlation test, indicates that, that part of the null hypothesis stating that "there is no significant difference in the dietary habits between elementary school children who have been taught a nutrition education unit and the control group who has not been exposed to nutrition education" must be rejected. The research hypothesis stating that "there is a significant difference in the dietary habits between elementary school children who have been taught a nutrition education unit and the control group who has not been exposed to nutrition education" was accepted.

CONCLUSIONS

Results from this study indicate that a nutrition education unit taught to elementary school children does increase their nutrition knowledge and does, to a lesser degree, have some effect on eating habits. The effectiveness of the nutrition education unit taught to 27 elementary students for a total of 8 one-half hour sessions was most evident in scores of a written test given at the beginning and conclusion of the study. There was a significant increase ($p < 0.01$) in these pre- and posttest scores indicating a significant increase in their cognitive learning. However, although they increased their cognitive learning significantly, they did not change their eating habits dramatically. The only significant change in eating habits was in the increased consumption of milk and a decreased consumption of coke at the ($p < 0.05$) level and at the ($p < 0.01$) level, respectively

Scores from the nutrition knowledge test show that the majority of the students were able to classify foods into their proper food groups prior to the nutrition education unit. This may have been due to the fact that these were common foods and the students were therefore able to make

the correct associations.

Very few students were able to identify the major nutrients in food or to identify the function of nutrients in our bodies prior to nutrition education. However, following the nutrition education unit, there was a significant increase in the number of students correctly answering these questions ($p < 0.01$).

Answers to such questions as to what the children would like for dinner or what they would like from the grocery store were all basically nutritious answers following the nutrition education unit, indicating not only that these students had a general knowledge of nutritious foods, but also desired to eat such foods.

From Table 6 it can be noted that many of the students did not always consume the RDA specified for each nutrient. During the second feeding, in the experimental group, the caloric and niacin intake were significantly lower than the RDA's specified. However, the RDA's determined for each nutrient may very well be above the amounts necessary for a normal, healthy, child since the RDA's are figured in order to assure health to the total population. Eight hundred calories is quite a large amount to consume at one meal. meal. However, these extra calories and nutrients needed to meet the RDA's are often obtained through snacking.

During the first feeding the calcium and thiamin intake by the experimental group was significantly lower ($p < 0.05$) than the RDA's specified for these nutrients. However, results from the second feeding (following nutrition education) indicated that there was no significant difference between the nutrient intake for these two nutrients and their RDA's.

The amount of protein, Vitamin A, and riboflavin consumed by the experimental group during the second feeding was significantly higher ($p < 0.05$) than the RDA's specified for these nutrients. However, the only significant increase, in comparison to the first feeding, was with the riboflavin intake. This was due primarily to the increased consumption of milk.

A Pearson's product-moment correlation test showed that there was a positive correlation between protein intake and nutrition knowledge ($p < 0.01$). However, no other correlations between nutrient intakes and nutrition knowledge were noted.

Although significant dietary changes were few, the significant increase in milk consumption with a significant decrease in coke consumption, following nutrition education, indicates that with further nutrition education, dietary habits can be changed.

IMPLICATIONS FOR FUTURE RESEARCH

Results from this study indicate that nutrition education does increase the nutrition knowledge of elementary school children and does improve dietary habits.

It is important, when planning a nutrition education unit for children, to involve the students and to capture their attention and interest. Special activities such as a fruit and vegetable tasting party, a nutrition bee, and a puppet show all help to accomplish these objectives. One might also observe students during their lunch period and perhaps try serving foods and beverages in or on interesting tableware to encourage the child to eat nutritiously. It is also suggested that the food be served from a cafeteria line, where the student has the opportunity to choose the foods he desires.

The effectiveness of this nutrition education unit may be better evaluated by checking the reliability of the nutrition knowledge test given to another sample and thereby modifying the nutrition knowledge test accordingly. It is suggested that the length of the test be shortened. Perhaps, by incorporating the nutrition unit into other existing subject matter covered during the school year

the effectiveness of this nutrition education unit would increase. If this education unit were taught and reinforced over a longer period of time perhaps the gap between cognitive learning and dietary habits might decrease.

APPENDIX A

LETTER OF EXPLANATION

Dear Parents:

There is an increasing awareness that some of the major nutritional health problems affecting are adult population are due to the direct or indirect consequences of dietary habits formulated in early childhood.

Obesity and coronary heart disease are just two examples of nutritional health problems often due to overeating and/or poor selection of foods. Research has shown that success is poor in the treatment of obesity. Its high and increasing prevalence clearly indicates a serious effort should be made to prevent the development of this disease; this effort should concentrate on the early years of life.

One of the basic needs for personal well-being is good nutrition. Nutrition education is very important in helping the child to learn to select nutritious foods. This education should begin at a very early age when children are formulating their everyday food habits. Langworthy (a 1913 researcher) stated his philosophy as this: "A well nourished mind is impossible in a poorly nourished body and physical health is essential to the full mental and moral development of our children." It is my attempt to teach your children good dietary practices in hopes that proper food selection will become part of their daily practice.

On the following page is a description of the study I will be conducting at the Palmer Montessori Elementary School. I would very much like to have your child participate in this study. Please read this description and have your child return the form with your appropriate response and signature. I am looking forward to working with your child in this particular study.

Sincerely,

Lisa Gilligan

APPENDIX B

CONSENT FORM

TO THE PARENTS:

I, Lisa Gilligan, would like to involve your child, _____, in a study concerning nutrition education. This research is being conducted in order to fulfill my requirements for my Master's Degree in Science from Texas Woman's University. The purpose of this study is to determine the effectiveness of a nutrition education program in improving the dietary habits and nutritional knowledge of elementary school children.

Approximately 60 children from the Palmer Montessori Elementary School will be used in this study. Initially, all 60 children will be grouped together and asked to eat a noon meal which will be provided by the researcher. This meal will be basically nutritious and will include some snack items. A test will be given to determine their nutritional knowledge. The students will then be divided into two groups. One of these groups will be taught basic nutrition principles with emphasis on good eating practices, snacking, and the relationship between food and good health. After the teaching session, both groups will again be grouped together and asked to eat a noon meal and again they will be given a test in order to help determine the effectiveness of nutrition education.

During the study the children will be exposed to no unusual inconveniences nor will they derive any special benefits from this study. His/her achievement or participation in this study will have no effect on his/her school grades. You may withdraw your child from this study at any time. If any part of this project is published, anonymity will be preserved by the encoding of all student's names; this code will be known only to the researcher.

I am willing to answer any questions you may have regarding this study. I would very much appreciate your approval for your child's participation.

_____I understand the nutrition education program outlined above and the implications it holds for myself and my child. I hereby give my child permission to participate in such a program

_____I do not wish to have my child participate in the nutrition education program.

Signature of Parent or Guardian	Date
Signature of Student	Date
Signature of Researcher	Date

APPENDIX C

FOOD TABLE

FOODS	AMT.	Kcal	PRO. g.	CAL. mg.	IRON mg.	VIT A I.U.	THIA. mg.	RIBFL. mg.	NIA. mg.	VIT C mg.
Meat Loaf	2.0oz	92	12.0	6.8	1.8	8.8	0.051	0.108	2.89	-
Green Beans with Bacon	62.5gm	23	1.2	28.2	0.98	294.0	0.026	0.033	0.25	2.5
Carrot Sticks	30.0gm	13	0.4	12.0	0.2	3600.0	0.018	0.018	0.20	-
Dinner Roll w/1tsp. marg.	1 ea.	149	3.2	29.0	0.7	165.0	0.11	0.070	0.80	-
Whole Milk	4.0oz	80	4.5	144.0	0.05	175.0	0.035	0.21	0.10	1.0
Coca Cola	4.0oz	48	-	-	-	-	-	-	-	-
Choc. Cupcake w/icing	1.75oz	218	2.6	35.0	0.55	75.0	0.018	0.051	0.15	tr.
Hershey Bar	1.05oz	152	2.0	45.7	0.3	18.2	0.02	0.1	0.44	0.22
Orange	1 med.	73	1.5	62.0	0.6	300.0	0.15	0.060	0.6	80.0
Apple	1 med	87	0.3	10.0	0.5	140.0	0.04	0.030	0.2	13.0
TOTALS		935	27.7	372.7	5.68	4776.0	0.468	0.68	5.63	89.72
1/3 RDA		800	12.0	267.0	3.0	1100.0	0.4	0.4	5.0	13.0

APPENDIX D

FOOD RECORD

Student's Name

Code Number

First Feeding

Foods	Amt. on Plate	Additional Servings	Amt. left on Plate	Total Amt. Eaten
Meat Loaf	2.0oz			
Green Beans w/ Bacon	62.5gm			
Carrot Sticks	30.0gm			
Dinner Roll w/ tsp. marg.	1 ea.			
Whole Milk	4.0oz			
CocaCola	4.0oz			
Choc. Cupcake w/ icing	1.75oz			
Hershey Bar	1.05oz			
Orange	1 med.			
Apple	1 med.			

Second Feeding

Foods	Amt. on Plate	Additional Servings	Amt. left on Plate	Total Amt. Eaten
Meat Loaf	2.0oz			
Green Beans w/ Bacon	62.5gm			
Carrot Sticks	30.0gm			
Dinner Roll w/ tsp. marg.	1 ea.			
Whole Milk	4.0oz			
CocaCola	4.0oz			
Choc. Cupcake w/ icing	1.75oz			
Hershey Bar	1.05oz			
Orange	1 med.			
Apple	1 med.			

APPENDIX E

NUTRITION KNOWLEDGE TEST

1. Circle the food-group each food represents.

a. Cottage Cheese

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

b. Chicken

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

c. Bread

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

d. Carrots

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

e. Apples

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

f. Ham

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

g. Milk

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

h. Hotdog Bun

1. Bread 2. Milk 3. Meat 4. Fruits and Vegetables

2. Select any four of these six foods that will make a complete meal.

a. Milk
b. Chicken
c. Carrots
d. Bread
e. Apple
f. Cottage Cheese

3. Select any four of these six foods that will make a complete meal.

a. Egg
b. Cheese
c. Biscuits
d. Grapefruit
e. Cornbread
f. Peas

4. Circle the major nutrient found in these foods.

a. Carrots

1. Vit. A 2. Vit. C 3. Vit. D

b. Milk

1. Vit. C 2. Calcium 3. Vit. B

c. Bread

1. Vit. B 2. Vit. C 3. Vit. D

d. Spinach

1. Vit. A 2. Vit. B 3. Protein

e. Liver

1. Iron 2. Vit. B 3. Vit. D

f. Eggs

1. Protein 2. Vit. A 3. Vit. D

g. Ice Cream

1. Calcium 2. Vit. C 3. Vit. B

h. Orange Juice

1. Vit. C 2. Vit. A 3. Protein

5. Circle the correct answer.

a. Iron is important because

a. it carries oxygen to the brain.
b. it helps us to see better.
c. it helps us to make our bones healthy.

b. Vitamin C is important for

a. healthy gums.
b. white teeth.
c. healthy skin.

c. Vitamin A is important for

a. strong bones.
b. healthy blood.
c. helping us to see in the dark.

d. B Vitamins are important for

a. helping to prevent colds.
b. giving us protein.
c. keeping our nervous systems healthy.

e. We drink milk because

a. it gives "bone building calcium."
b. it tastes good
c. it makes our hair shiny.

f. It is important to eat a balanced diet because

a. it makes you healthy.
b. your parents want you to.
c. we need water every day.

g. We need calcium because

a. it builds healthy bones and teeth.
b. it prevents colds.
c. it is a good snack.

h. Carrots are high in

   a. Vit. D
   b. Vit. C
   c. Vit. A

i. Orange juice is important because

   a. it is high in iron.
   b. it is high in Vitamin C.
   c. it is high in Vitamin A.

j. It is important to eat breakfast because

   a. all of our friends do.
   b. it gives us energy to start the day.
   c. we can eat cereal and fruit.

k. Vitamin D is important for

   a. healthy eyes.
   b. a healthy nose.
   c. healthy bones and teeth.

l. We need to eat meat because

   a. it helps us grow.
   b. it prevents colds.
   c. it makes us fat.

m. We do not want to eat too much sugar because

   a. it costs a lot.
   b. it causes cavities.
   c. it makes us hungrier.

n. If you could have anything you wanted for supper tonight, what would you want?

o. When Mom or Dad goes to the grocery store, what do you ask them to bring you?

APPENDIX F

OBJECTIVES

Competency 1.	To explain the meaning of the words "nutrition" and "nutrients."
TPO 1.1	Upon completion of the first session, the student will be able to correctly define the words "nutrition" and "nutrients" using the definitions given by the instructor.
EO 1.1.1	The student will be able to define "nutrition."
LA 1.1.1.1	Participate in the discussion of the meaning of "nutrition."
LA 1.1.1.2	Listen to the instructor's definition of "nutrition."
EO 1.1.2	The student will be able to define "nutrient."
LA 1.1.2.1	Participate in the discussion of the meaning of "nutrients."
LA 1.1.2.2	Listen to the instructor's definition of "nutrients."
Competency 11.	To list the essential nutrients found in the foods from the Basic Four.
TPO 2.1	Upon completion of the first session, the student will be able to identify the essential nutrients found in foods presented by the instructor.
EO 2.1.1	The student will be able to name the essential nutrients found in different foods from the Basic Four.
LA 2.1.1.1	Participate in discussion of "What Makes Our Body Run."
LA 2.1.1.2	Refer to poster on "What Makes Our Body Run."
EO 2.1.2	Given a list of foods, the student will be able to name the major nutrient found in each different food.

LA 2.1.2.1	Listen to discussion on "Foods Contain Nutrients."
LA 2.1.2.2	By using food models, identify nutrients found in different foods.
Competency 111.	To name the Basic Four food groups, state the recommended number of servings from each group, and to categorize food items into one of the Basic Four food groups.
TPO 3.1	Upon completion of the second session, the student will be able to name the Basic Four food groups from memory when asked by the instructor with 100% accuracy.
EO 3.1.1	The student will be able to name the Basic Four food groups.
LA 3.1.1.1	Participate in discussion of the different food groups.
LA 3.1.1.2	Listen to lecture on the "Basic Four Food Groups."
LA 3.1.1.3	Refer to poster - "A Guide to Good Eating."
TPO 3.2	Upon completion of the second session, the student will be able to state the recommended number of servings from the Basic Four from memory when asked by the instructor with no more than one error.
EO 3.2.1	The student will be able to state the recommended number of servings from each of the Basic Four food groups.
LA 3.2.1.1	Listen to lecture on "The Basic Four."
LA 3.2.1.2	Refer to poster - "A Guide to Good Eating."
TPO 3.3	Upon completion of the second session the student will be able to categorize food into one of the Basic Four food groups by correctly answering the first eight questions on the nutrition knowledge test with 88% accuracy.
EO 3.3.1	Given a food item, the student will be able to categorize it into one of the Basic Four food groups.

LA 3.3.1.1	Listen to the lecture on "Foods Found in the Basic Four."
LA 3.3.1.2	Use food models to practice categorizing foods into one of the Basic Four food groups.
LA 3.3.1.3	Refer to poster - "A Guide to Good Eating."
LA 3.3.1.4	Bring in magazine pictures of foods from each of the four food groups.
LA 3.3.1.5	Participate in Nutrition Bee.
Competency IV.	To describe the components of a "balanced" meal.
TPO 4.1	Upon the completion of the third session, the student will be able to correctly define a "balanced" meal when asked by the instructor, using the definition given by the instructor.
EO 4.1.1	The student will be able to define a "balanced" meal when asked by the instructor.
LA 4.1.1.1	Observe filmstrip - "The Power of Food."
LA 4.1.1.2	Participate in discussion of a "balanced" meal.
LA 4.1.1.3	Refer to poster - "What Makes a Good Lunch."
LA 4.1.1.4	Refer to poster - "What Makes a Good Dinner."
LA 4.1.1.5	Refer to poster - "Balance."
LA 4.1.1.6	Bring in an example of a "balanced" meal using pictures cut out from magazines.
Competency V.	To describe the foods found in the Meat and Milk groups.
TPO 5.1	Upon completion of the fourth session, the student will be able to name the foods found in the Meat and Milk groups by correctly answering the associated questions on the Nutrition Knowledge Test (Part 1 - a, b, f, and g) with 100% accuracy.
EO 5.1.1	Given a list of foods, the student will be able to correctly categorize these foods into their appropriate food group.

LA 5.1.1.1	Participate in the discussion of foods found in the Meat and Milk groups.
LA 5.1.1.2	Listen to lecture on "Foods Found in the Meat and Milk Groups."
LA 5.1.1.3	Refer to poster - "A Guide to Good Eating."
Competency V1.	To choose the major nutrients and the associated functions of these nutrients found in foods from the Meat and Milk groups.
TPO 6.1	Upon completion of the fourth session, given a list of nutrients and their associated function, the student will be able to choose the major nutrients and the associated function of these nutrients found in foods from the Meat and Milk groups by answering the associated questions on the Nutrition Knowledge Test (Part 4 - b, e, f, g, and Part 5 - a, d, e, g, k, and l) with 80% accuracy.
EO 6.1.1	Given a list of nutrients, the student will be able to identify calcium as an important nutrient found in the Milk group.
LA 6.1.1.1	Participate in discussion on nutrients found in the Milk group.
LA 6.1.1.2	Attend lecture on "Nutrients Found in the Milk Group."
EO 6.1.2	Given a list of reasons of why calcium is important in the diet, the student will choose the correct response.
LA 6.1.2.1	Attend lecture on "The Importance of Calcium in the Diet."
EO 6.1.3	Given a list of reasons of why Milk and Meat are important in the diet, the student will choose the correct response.
LA 6.1.3.1	Participate in discussion of why Milk and Meat are important in the diet.
LA 6.1.3.2	Attend lecture on the "Importance of Milk and Meat in Your Diet."

EO 6.1.4	Given a list of reasons of why Vitamin B and iron are important in the diet, the student will be able to choose the correct responses
LA 6.1.4.1	Participate in discussion of nutrients found in the Meat group.
LA 6.1.4.2	Attend discussion on nutrients and their function in the Meat group.
Competency VII.	To describe the major nutrients and the associated functions of the nutrients found in the Fruits and Vegetables group.
TPO 7.1	Given a variety of foods and information that foods contain certain nutrients, the student will be able to identify the major nutrients and state the function of these nutrients found in the Fruit and Vegetable group by answering the associated questions on the Nutrition Knowledge Test (Part 4 - a, d, h, and Part 5 - b, c, h, and i) with 86% accuracy.
EO 7.1.1	Given a list of vitamins and minerals, the student will be able to identify Vitamin A as the vitamin provided by green, leafy and yellow-orange vegetables.
LA 7.1.1.1	Participate in the discussion of foods found in the Fruit and Vegetable group.
LA 7.1.1.2	Listen to discussion on nutrients found in the Fruits and Vegetables group.
LA 7.1.1.3	Use food models to choose gree, leafy vegetables.
EO 7.1.2	Given a list of reasons why Vitamin A is important in the diet, the student will be able to choose the correct response.
LA 7.1.2.1	Participate in the discussion of why vegetables are important.
LA 7.1.2.2	Listen to discussion on Vitamin A.
EO 7.1.3	Given a list of vitamins and minerals, the student will be able to identify Vitamin C as the major vitamin provided by fruits.

LA 7.1.3.1	Attend discussion on Vitamin C.
LA 7.1.3.2	Obseve different citrus fruits.
LA 7.1.3.3	Refer to poster - "Citrus, the Vitamin C Family."
EO 7.1.4	Given a list of reasons of why Vitamin C is important in the diet, the student will be able to choose the correct response.
LA 7.1.4.1	Participate in discussion of why orange juice is important for you.
LA 7.1.4.2	Attend lecture on the importance of Vitamin C in the diet.
EO 7.1.5	Given a list of foods, the student will be able to distinguish which foods are fruits and which are vegetables.
LA 7.1.5.1	Observe and identify food models of fruits and vegetables.
LA 7.1.5.2	Participate in the tasting of a variety of fruits and vegetables.
Competency V111.	To describe the major nutrients and the associated function of these nutrients found in the Breads and Cereal group.
TPO 8.1	Given a variety of foods and the information that foods contain certain nutrients, the student will be able to identify the major nutrients and state the function of the nutrients found in the Breads and Cereal group by answering the associated questions on the Nutrition Knowledge Test (Part 4 - c, and Part 5 - d) with 100% accuracy.
EO 8.1.1	Given a list of nutrients, the student will be able to identify the B Vitamins as important nutrients found in the Breads and Cereal group.
LA 8.1.1.1	Attend the discussion on B Vitamins.
LA 8.1.1.2	Refer to poster - "A Guide to Good Eating."
LA 8.1.1.3	Read labels on food to look for amount of B Vitamins.

EO 8.1.2 Given a list of reasons of why B Vitamins are important in the diet, the student will be able to choose the correct answer.

LA 8.1.2.1 Participate in the discussion of why bread is important for you.

LA 8.1.2.2 Attend the discussion on the Breads and Cereal group.

Competency IX. The student will be able to state the role of nutritious foods in growth and health.

TPO 9.1 Upon completion of the sixth session the student, given a list of foods from the B Basic Four, will be able to identify the food group, one major nutrient found in each food, and the importance of each nutrient by answering the associated questions on the Nutrition Knowledge Test (Part 1, Part 4, and Part 5 - a, b, c, d, g, h, i, and k) with 88% accuracy.

EO 9.1.1 Given pictures of foods from the Basic Four, the student will be able to identify the food group, name a major nutrient found in each group, and name the importance of these nutrients in the body.

LA 9.1.1.1 Review the Basic Four.

LA 9.1.1.2 Using food models, identify food groups, major nutrients, and the related function of each nutrient.

Competency X. The student will be able to state the importance of a nutritious breakfast in relation to growth and health.

TPO 10.1 Upon completion of the seventh session, the student, given a list of food items, will be able to choose a balanced breakfast with 100% accuracy.

EO 10.1.1 Given a list of food items, the student will be able to choose a balanced breakfast.

LA 10.1.1.1	Participate in the discussion of the Basic Four.
LA 10.1.1.2	Discuss the breakfast you ate this morning.
LA 10.1.1.3	Listen to the lecture on the importance of a balanced breakfast.
LA 10.1.1.4	Using food models, prepare a balanced breakfast.
TPO 10.2	Upon completion of the seventh session, given a list of reasons of why a balanced breakfast is important, the student will be able to choose the correct response.
EO 10.2.1	Given a list of reasons of why breakfast is important, the student will be able to choose the correct response.
LA 10.2.1.1	Participate in the discussion of the importance of eating a good breakfast.
LA 10.2.1.2	Listen to the discussion of why breakfast is important.
Competency X1.	To state the nutritional implications of snacking.
TPO 11.1	Upon completion of the eighth session, the student will be able to describe the relationship of eating nutritious snacks to growth and health by answering the associated questions on the Nutrition Knowledge Test (Part 5 - m, o) with 100% accuracy.
EO 11.1.1	The student will be able to define snacking using the same terminology that the instructor has used in class.
LA 11.1.1.1	Participate in discussion of "snacking."
LA 11.1.1.2	Listen to the instructor's definition of snacking.
EO 11.1.2	The student will be able to name nutritious snacks.
LA 11.1.2.1	Participate in discussion of nutritious snacks using examples from magazines.
LA 11.1.2.2	Refer to poster - "What Makes a Good

	Snack."
LA 11.1.2.3	View Puppet Show.
EO 11.1.3	The student will be able to relate dental caries and obesity to poor snacking habits.
LA 11.1.3.1	Participate in discussion of poor snacking habits and oversnacking.
LA 11.1.3.2	Refer to poster on dental caries.
LA 11.1.3.3	Refer to poster on obesity vs. normal weight.
LA 11.1.3.4	View Puppet Show.

SESSION ONE

MATERIALS YOU WILL NEED:

"What Makes Our Body Run" - poster
Flannel Board
Food Models and Names of the Essential Nutrients

LECTURE OUTLINE

I. Definition of nutrition: Study of eating the right foods so that you can grow and stay healthy.

II. Definition of nutrients: Substance found in foods that help our bodies to grow and to stay healthy.

III. Essential Nutrients

- A. Protein
  1. meat, cheese, eggs, and milk
  2. function in bodily growth
- B. Fat
  1. butter, margarine, and mayonnaise
  2. provides extra energy
- C. Carbohydrate
  1. bread, potatoes, rice, and cereal
  2. provides energy
- D. Vitamins and Minerals
  1. fruits, vegetables, bread, milk, and meat
  2. function in growth and maintenance of health

SUGGESTED LECTURE

Good morning class. Today we are going to talk about two words you've probably all heard before either on TV or on the radio but just weren't sure what they meant. Let's begin with the first word - Nutrition. How many of you have heard of the word "nutrition" before? Does anyone have any idea of what "nutrition" means? Nutrition is the study of eating the right foods so that you can grow and stay healthy. Food is very important because we all need

to eat in order to live. We must eat the right foods and the right amount of these foods in order to grow and to stay healthy. If we did not eat, we would not have the energy to play baseball or football, or to walk our dog, or even to think in school.

It is important that we eat the right foods and the right amount of these foods. But, what are the right foods to eat? The right foods to eat are foods that provide our bodies with Nutrients. This is the second word we are going to talk about today. Can anyone tell me what the word "nutrient" means? Nutrients are substances found in food that help our bodies to grow and to stay healthy. When your mother takes care of the plants in your house, she gives them water and puts them in the sunlight. The water and the sunlight help the plant to grow and to be healthy; they are the plant's nutrients.

Now, think for a minute about a train. (show poster - "What Makes Our Body Run") We have the engine, the coal car and the caboose. The engine is like our body. Next is the coal car. This carries the fuel that makes the train run. Without the coal, the train would not run. Our bodies work in much the same way; it is a miraculous machine. We get our "fuel" from food. To make our bodies run, we must eat foods that contain Protein, Fat, Carbohydrates, Vitamins and Minerals. All of these are nutrients. Let's say them

all together. (put words on flannel board) All of these are nutrients and they help us to grow and keep our bodies running. The caboose represents good health. If we eat foods that contain these nutrients (repeat nutrients) our bodies will grow and remain healthy.

Now, let's talk about what foods have these nutrients that make our bodies run. Let's begin with Protein. What foods do you think might have protein? Protein is found in meat, cheese, eggs, and milk. (use food models) If we eat these foods, we are supplying our bodies with the protein that it needs to help us grow.

In what foods do you find fat? Fat can be found in such foods as butter, margarine, and mayonnaise. (use food models) Fat gives us extra energy to work and play.

Carbohydrates are found mainly in white foods such as bread, potatoes, rice, macaroni, and cereal. (use food models) All of these foods provide us with energy our bodies need to grow, to work and to play.

Vitamins and minerals are found in many different foods. Fruits and vegetables contain many vitamins and minerals. You've probably all seen Popeye, right? He eats his spinach because the vitamins and minerals help him to grow and to stay healthy.

It is important that we eat foods that contain these

nutrients we have talked about. If you owned a car or a train, you would put fuel into it in order to make it run. Your body needs "fuel" too. By eating the right foods, foods that supply your body with all of the nutrients, your body will run well and stay healthy.

SESSION TWO

MATERIALS YOU WILL NEED:

"A Guide to Good Eating" - poster
Food Models
Flannel Board

LECTURE OUTLINE

I. Review of the essential nutrients

II. Basic Four Food Groups

A. Milk Group
1. protein source
2. foods found in the milk group.
3. 3 servings/day are recommended

B. Meat Group
1. protein source
2. foods found in the meat group
3. 2 servings/day are recommended

C. Fruit and Vegetable Group
1. vitamin and mineral source
2. foods found in the fruit and vegetable group
3. 4 servings/day are recommended

D. Bread and Cereal Group
1. carbohydrate source
2. foods found in the bread and cereal group
3. 4 servings/day are recommended

SUGGESTED LECTURE

Good morning class. Yesterday we talked about nutrition and the nutrients we need to grow and to stay healthy. Who remembers some of the nutrients we need? There are so many kinds of food and many different nutrients, so how can we be sure our body gets the nutrients it needs? To help us choose our foods we have the Basic Four. (show poster - "A Guide

to Good Eating") By eating foods from these four food groups you can get the nutrients that your body needs.

Let's begin with the Milk group. Milk is high in protein - one of the nutrients our body needs. Some of the foods found in the Milk group are milk, cheese, and ice cream. You need protein to grow, so you should be sure to have at least three servings from the Milk group each day. You can drink three glasses of milk every day or you could have less milk and choose other foods from the Milk group.

Next is the Meat group. This group provides us with protein too. So you can see there are many foods you can eat to get the protein your body needs. There are many foods in the Meat group. Some you might think of right away are: hamburgers, steak, chops, roast, ham, hot dogs, sausage, liver, and chicken.

There are other foods you might not think of in this group such as eggs, peanut butter, dried beans, and dried peas. Perhaps you've never seen dried beans or dried peas before they are cooked. But you have eaten baked beans and pea soup. You should have at least 2 servings from the Meat group each day. It is even better to eat a serving at every meal.

Next we have the Fruit and Vegetable group. Let's look at some of the foods in this group. Apples, oranges, grapes, green beans, carrots, and cauliflower are all members of

this group. These foods contain many vitamins and minerals. Many times your mother will tell you to eat your vegetables or to drink your orange juice. This is because she loves you and she knows that these foods contain important vitamins and minerals that your body needs to grow and to stay healthy. You should have at least 4 servings/day from the Fruit and Vegetable group.

The last group is the Bread and Cereal group. There are many foods that you can choose from in this group. Not only bread and rolls and hot and cold cereals, but such foods as pancakes and muffins, and also biscuits. This group provides us with the carbohydrates our bodies need for the energy we need to work and to play. You should have 4 servings/day from the Bread and Cereal group.

We need to supply our bodies with nutrients in order to grow and to remain healthy. If you choose foods from the Basic Four food groups - Milk group, Meat group, Fruits and Vegetable group, and the Bread and Cereal group - and eat the recommended number of servings from each group every day, you will be giving your bodies the nutrients it needs.

I'm now going to show you some pictures of different foods. I want you to name the food and tell me which one of the four food groups it belongs to. (use flannel board. Split group in half for Nutrition Bee.)

SESSION THREE

MATERIALS YOU WILL NEED:

"The Power of Food" - filmstrip
"What Makes A Good Lunch" - poster
"Balance" - poster
"What Makes A Good Dinner" - poster
Nutribird T-shirt

LECTURE OUTLINE

1. Definition of a "balanced" meal: A meal that includes at least one serving from each of the four food groups.

II. Power of Food

   A. Necessary Nutrients

   B. Basic Four Food Groups

III. A "Balanced" Meal

   A. What Foods Make Up a "Balanced" Meal
      1. The basic four
      2. assembling a "balanced" meal

SUGGESTED LECTURE

Good morning class. Today I have a special treat for you. We are going to watch a filmstrip called the "Power of Food" but first I would like to talk to you about what a "balanced" meal means. Who remembers the Basic Four food groups? (have students name them) I'd like to show everyone this T-shirt. This is Nutribird (our Nutrition Bird) and he says to "eat a balanced diet everyday." He means that we should eat a complete meal, a meal that includes food from all four of the food groups, at each meal everyday. These

foods contain the nutrients that are necessary for our bodies to grow and to stay healthy. So, to eat a balanced diet means to eat meals that include food from each of the four food groups

We are now going to watch the filmstrip, the "Power of Food." Food gives us the power to make our bodies run just like the coal that makes a train run. I want you to watch the filmstrip and pick out the nutrients that are mentioned and watch for the foods that are from the Basic Four food groups. (show filmstrip)

Did everyone enjoy the filmstrip? Now that you've learned what foods make a "balanced" meal, may I have a volunteer to make a "balanced" meal using the food models.

SESSION FOUR

MATERIALS YOU WILL NEED:

Food Models
Flannel Board
Poster on Dental Health
"A Guide to Good Eating" - poster

LECTURE OUTLINE

1. Milk Group

   A. Foods found in the Milk group

   B. Importance of milk in the diet
      1. protein
      2. calcium

11. Meat Group

   A. Foods found in the Meat group

   B. Importance of meat in the diet
      1. protein
      2. iron
      3. B-vitamins

SUGGESTED LECTURE

Today we are going to talk about two of the four food groups - the Milk group and the Meat group. Let's begin with the Milk group. Who can name some of the foods we find in the Milk group? (show food models) Why do you think you should drink milk? Milk is high in protein so it helps our bodies to grow. Milk also has calcium. We need calcium to help build strong bones and healthy teeth. Calcium is like the cement that builders use to hold bricks together. Without the cement, the bricks would not be strong and would

not stay together. Without calcium our bones and teeth would not be strong and healthy. Our bones would be weak and might even break. (show poster on dental health)

Calcium builds healthy bones and teeth. Foods from the Milk group provide us with calcium. Milk, ice cream, and cheese are all found in the Milk group so all of these foods give us "bone building calcium." (refer to poster - "A Guide to Good Eating") That's why it is important that we drink at least three glasses of milk each day or drink less milk and eat other foods from the Milk group.

The next group is the Meat group. Who can name some of the foods found in the Meat group? (show food models) Foods from the Meat group also have protein just like foods from the Milk group. Remember that protein helps our bodies to grow.

Eggs and meat, especially liver, have not only protein but they also have iron. Why do you think our bodies need iron? Iron is important because it carries oxygen (air) to our brain. If we did not have oxygen going to our brain, our brain would not be able to "breathe." We wouldn't be able to think or work or play. Our brain needs air to stay alive. And iron is what carries the oxygen to the brain.

The meat group also has B Vitamins. B Vitamins make our nerves and skin healthy. Without sufficient amounts of B

Vitamins we might have scaly skin. (show Vitamin B poster)

Let's review what we learned today. We drink milk because it has protein; this helps us to grow. Milk has calcium too which makes our teeth and bones strong and healthy.

Meat has protein, iron, and B Vitamins. The protein helps our bones to grow, the iron carries oxygen to our brain and the B Vitamins keep our nerves and skin healthy.

SESSION FIVE

MATERIALS YOU WILL NEED:

Food Models
Flannel Board
"Citrus, the Vitamin C Family" - poster
Decorated Citrus Fruit
1. "Juicy" Orange
2. "Gertie" Grapefruit
3. "Zippy" - Keen Tangerine

Iodine on Starch Experiment
1. One Bottle of Household Iodine
2. Whole Kernel Corn, Potato or other Starch vegetable
3. Lettuce, Green Beans, or other Non-Starchy vegetable

Sampling Fruits and Vegetables
1. Raw Carrots
2. Grapefruit
3. Oranges
4. Celery
5. Tomatoes
6. Cucumbers

LECTURE OUTLINE

1. Fruits and Vegetable Group

   A. Foods Found in the Fruits and Vegetable Group

   B. Importance of Fruits and Vegetables in the Diet
      1. fruits
         a. citrus fruits - high in Vitamin C
         b. others - high in vitamins and minerals
      2. vegetables
         a. green leafy or yellow - high in Vitamin A - low in calories
         b. starchy vegetables - Vitamin A source - higher in calories than green leafy or yellow vegetables
         c. difference between starchy and non-starchy vegetables - iodine on starch experiment
      3. sampling of fruits and vegetables

SUGGESTED LECTURE

Today we are going to talk about some of the nutrients

we find in the Fruit and Vegetable group. First, let's name some of the foods we find in this group. (use food models and flannel board) As you can see there are many foods in this group. It is important that we not only have four servings from the Fruit and Vegetable group each day, but these servings should include a dark, green leafy vegetable or a deep yellow vegetable and also some type of citrus fruit. (show examples using food models) Why do you think we need to eat both green leafy or yellow vegetables and some type of citrus fruit each day? Deep green and yellow vegetables supply our bodies with high amounts of Vitamin A and citrus fruits are high in Vitamin C. Can anyone name some citrus fruits? (show poster - "Citrus, the Vitamin C Family") Oranges, grapefruits, and tangerines are all citrus fruits. Today we have "Juicy" Orange, "Gertie" Grapefruit and "Zippy" Tangerine to visit with us today. (show decorated citrus fruits) Other fruits are good too. They have vitamins and minerals too, but they don't have as much Vitamin C as citrus fruits have. Vitamin C is important for helping us to prevent colds and infections. It also keeps our gums healthy. If you do not get enough Vitamin C sometimes your gums will bleed. This is one reason why it is important to drink your orange juice when your mom tells you to. Moms are smart and they want to keep you healthy.

How many of you like vegetables? There are many

different kinds of vegetables. (show food models) Some vegetables are starchier than others such as corn and potatoes. These foods have more calories than the non-starchy vegetables so we should not overeat them. How can you tell the difference between starch and non-starchy vegetables? Let's do an experiment. (iodine on starch experiment)* Now it will be easier to remember which vegetables are starchy and which ones are not.

As you remember, vegetables are high in Vitamin A. Does anyone know why we need Vitamin A? Vitamin A is important for giving us healthy skin and eyes. People who don't get enough Vitamin A can suffer from a condition called "night blindness" in which they cannot see very well in the dark or at night. Spinach and carrots are two vegetables high in Vitamin A and they should be included in our diet.

I have a treat for all of you today. I've brought some fruits and vegetables that I would like all of you to taste. As you taste these fruits and vegetables think about what vitamins they are high in and why it is important for us to eat these foods.

* Iodine on starch experiment: Drop small amounts of iodine on non-starchy vegetables and its color will remain the same. On starchy vegetables it will turn blue.

SESSION SIX

MATERIALS YOU WILL NEED:

Food Models
Flannel Board
"A Guide to Good Eating" - poster
Poster on the parts of whole grain
Bran Cereal
Whole Wheat Bread

LECTURE OUTLINE

1. Bread and Cereal Group

   A. Foods found in the Bread and Cereal group

   B. Importance of bread and cereal in the diet
      1. B-vitamins - keep nervous system healthy
      2. Function of fiber in the diet

11. Review of the Basic Four

   A. Food Groups

   B. Nutrients and their Functions

SUGGESTED LECTURE

Today we are going to talk about the fourth and final group - the Bread and Cereal group. (show poster - "A Guide to Good Eating") Who can name some foods from this group? (have students put the food models on the flannel board) No matter what foods you choose from this group - bread, rolls, hot and cold cereals, pancakes, muffins, and biscuits - there is one thing that is the same about all of these foods. They are all made from grains such as wheat, oats, corn and rice; all of these foods contain B Vitamins. When you eat your cereal and toast in the morning, you are

getting some of the B Vitamins you need for the day. (show cereal box and whole wheat bread and point out where it says B Vitamins) When you eat a sandwich at lunch, the bread you eat has B Vitamins. At supper, when you eat rice or macaroni, you are again getting the B Vitamins you need. Who can tell me why it is important to nourish your body with foods that have B Vitamins? It is important because B Vitamins keep our nervous system healthy.

Foods in this group also contain "fiber." How many have heard of the word "fiber?" Foods high in fiber have more bran (show poster on parts of the grain). Bran is the outer coating of a grain and it helps get rid of waste materials from our bodies. For this reason it is important that we include some high fiber breads and cereals in our diet.

We have now studied all four of the Basic Food groups and the different nutrients each group is high in. I am now going to hold up a picture of a certain food and I want you to tell me which food group it belongs to and name one of the nutrients you would find in that food. I'll help you with any that you have trouble with. (example - carrots; Vegetable group, high in Vitamin A which helps us to see in the dark)

SESSION SEVEN

MATERIALS YOU WILL NEED:

Flannel Board
Food Models
"What Makes A Good Breakfast For You" - poster
"A Guide to Good Eating" - poster

LECTURE OUTLINE

I. The Importance of Breakfast

A. Breakfast Nourishes Our Body After A Night-time Fast

B. Breakfast Gives Us the Energy to Start the Day

II. A "Balanced" Breakfast

A. What Foods Make Up a "Balanced" Breakfast
1. the basic four
2. discussion of the student's breakfast
3. assembling a "balanced" breakfast

SUGGESTED LECTURE

Good morning class. Did you know that eating a good breakfast is the best way to start your day? How many of you have ever heard someone say, "I don't have time for breakfast," "I'm not hungry in the morning," or "I'm on a diet?" Everyone should eat breakfast; it is a very important part of your day. It has been a long time since you last ate so it is important to nourish your body in order to give you the energy you need to start your day.

How many of you have seen your mother water the plants in the morning? She does this because during the night the plants use the water from the day before and they need more

in order to have the energy necessary for them to grow. Your body works in much the same way. During the night your body uses the food you ate for dinner and it needs more food to give you the energy you need to get through the day.

How many of you ate breakfast this morning? What did you have? (allow time for discussion) How did you feel after breakfast?

What is a good breakfast? (show poster - "What Makes A Good Breakfast For You") It is important to choose foods from the Basic Four food groups to assure yourselves that you are getting the nutrients your body needs. Would a breakfast of doughnuts and coffee be a good "balanced" breakfast? Why?

Let's name some foods you might eat for breakfast. We need foods from the Milk group, the Bread and Cereal group, and the Fruits and Vegetable group. Foods from the Meat group may be included. However, we only need two servings from the Meat group each day so foods from this group are not necessary at this meal. (have students name foods from all four food groups. Refer to poster, "A Guide to Good Eating") Who would like to fix a "balanced" breakfast using the food models?

SESSION EIGHT

MATERIALS YOU WILL NEED:

Picture of Obese Person
Picture of Tooth Decay
"What Makes A Good Snack" - poster
Puppets
1. Healthy Heather
2. Panic Pete
School Bell
Orange
Hard Boiled Egg
Hershey Bar
Coke Can
Celery
Carrots
Chive Dip

LECTURE OUTLINE

1. Snacking

A. Definition of "Snacking": Eating between meals

B. Consequences of Poor Snacking Habits
1. obesity
2. dental caries

C. Nutritious Snacks
1. foods from the basic four
2. examples from the students

11. Puppet Show

A. "You Are What You Eat"
1. review of basic nutrition principles
2. review of nutrients and their functions

SUGGESTED LECTURE

Today we are going to talk about snacking. Can anyone tell me what "snacking" means? The food that you eat in-between meals are called snacks. So when you eat between meals you are "snacking." We have talked about eating a

balanced meal at breakfast, lunch and at dinner, but what about when you want to eat in-between meals? Snacking is not bad for you, but you must learn to choose your snacks wisely since they too are part of your diet. How many of you are hungry when you get home from school? What types of snacks do you eat? If we snack too much we can get fat. (show picture of obese person) If we eat many sweets such as candy or cookies, we can get cavities and find ourselves at the dentist. (show picture of tooth decay)

Here is a poster of some of the snack foods that are good for you. (show poster on snack foods) Who can name some other snack foods that are good for you? (allow time for discussion)

Today I have two special guests to talk to you - Healthy Heather and Panic Pete. They are going to do a puppet show for you called "You Are What You Eat."

HEALTHY HEATHER and PANIC PETE
in
"YOU ARE WHAT YOU EAT"

H.H (waking Panic Pete up) Get up Panic Pete. You won't have time for breakfast before school. I've already eaten. I had a glass of orange juice, an egg, a glass of milk and a piece of toast with butter. I made sure I had a serving of food from each of the four food groups. I'm ready to start my day. I think I'll walk to school today - see you there.

P.P (getting out of bed) Oh, I hate to get out of bed in the morning. Someday they'll start school at a

decent hour in the morning.

H.H. (at school) Good morning Panic Pete. (panic Pete is panting) You look tired and you are out of breath.

P.P. Well, like always, I jumped out of bed just in time to make it to school before I was late.

H.H. You mean you didn't have time to eat breakfast this morning?

P.P No Healthy Heather. You know I hardly ever eat breakfast. I'd rather sleep in the morning.

H.H. Then where do you get the energy to start your day?

P.P. Oh, I always have energy. I don't need breakfast.

H.H. Breakfast is important Panic Pete. It has been a long time since your last meal so your body needs food to give you the energy you need to start the day. (school bell rings) Oh, ther's the school bell. We'd better get to class. (Panic Pete lags behind) Come on Panic Pete. Where's all that energy you said you had?

(in the classroom) Hey panic Pete, wake up. You've been sleeping for the past 15 minutes. It's snack time and it looks like you could use some extra energy.

P.P. That's for sure. I think I'll go downstairs and buy something from the vending machines. (Panic Pete exits)

H.H. I'm so glad it is snack time. I'm starving. Hum, I think I'll have an orange for my snack. (takes out orange) Oranges are always so sweet and juicy and they are high in Vitamin C which will help my gums and teeth to stay healthy. A hard boiled egg sounds good too. (takes out hard boiled egg) The egg is high in protein so it will help my bones to grow.

P.P. (returns to the classroom with a hershey bar and a coke) Oh boy, a hershey bar and a soda. This is the first thing I've eaten all day.

H.H. Panic Pete, don't you know that coke and candy are not good for you? These foods are not found in the Basic Four food groups and they are made mostly of sugar. They cause cavities because of the high amounts of sugar.

P.P. I know what you mean Healthy Heather. I had six cavities last time I went to the dentist.

H.H. Also, candy and coke don't have any of the nutrients that we need to stay healthy. If you want something sweet, it would be much better to drink some chocolate milk or to eat some ice cream. Milk and ice cream are both found in the Milk group and they contain calcium and protein. The protein helps our body to grow and the calcium makes our bones and teeth strong and healthy.

P.P. Oh, I see Healthy Heather. When I snack I should always try to pick some foods that are found in the Basic Four food groups so that I will be sure that I am supplying my body with some of the nutrients it needs to stay healthy.

H.H. (school bell rings) Oh, I'm so glad school is out.

P.P. Me too Healthy Heather. I'm starving. Do you want to stop at the bakery on the way home and buy some brownies and cookies?

H.H. No thank you Panic Pete. I'm just going to go home and fix a nutritious snack there. I need to eat foods that will give me the energy I need to play baseball tonight.

P.P. Oh, you're always worrying about staying healthy. I guess that's why mother named you Healthy Heather.

(Healthy Heather at home eating carrots and celery with chive dip) Hey, what's that stuff you are eating?

H.H. Some celery and carrots with chive dip. It tastes really good. These foods are good for you too. Carrots and celery are high in Vitamin A and they help us to see at night. Did you know that some people who do not eat enough food with Vitamin A

can suffer from a condition called "night blindness?" Would you like to taste these vegetables Panic Pete.

P.P. No thanks Healthy Heather. I stopped at the bakery and ate some brownies so I'm not too humgry. I think I'll go take a nap.

H.H. (in the evening) Panic Pete, wake up. Are you going to play baseball tonight with the gang?

P.P. No. I don't feel too well; I have a stomach ache. I think I ate too many brownies.....

H.H. and coke and candy bars.

P.P. Healthy Heather, you sure seem to know what are the healthy foods to eat. You are always eating healthy foods and it seems that you are always healthy. I guess it is true. "You are what you eat." Tomorrow I'm going to start eating breakfast and choosing food from the Basic Four food groups. Will you help me Healthy Heather?

H.H. That sounds wonderful Panic Pete. Tomorrow we'll get up and begin our day with a healthy breakfast and we'll eat nutritious snacks. If we eat healthy foods, we will be healthy. (Panic Pete and Healthy Heather hug each other) THE END.

APPENDIX G

ANALYSIS OF VARIANCE OF NUTRITION TEST SCORES OF EXPERIMENTAL GROUP TAUGHT A NUTRITION EDUCATION UNIT AND THE CONTROL GROUP NOT TAUGHT THIS UNIT

Source	df	Sum of Squares	Mean Squares	F	F prob.
Total	101	2649.9672			
Between groups	50	1162.9600			
Conditions	1	106.1668	106.1688	4.923*	.0293
$Error_b$	49	1056.7928	21.5672		
Within groups	51	1487.0019			
Trials	1	127.4118	127.4118	6.975*	.0107
Trials x conditions	1	464.5165	464.5165	25.430*	.0001
$Error_w$	49	895.0732	18.2668		

* Significant at the 0.05 level of probability
** Significant at the 0.01 level of probability

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