

DEVELOPMENT AND EVALUATION OF INDIVIDUALIZED
INSTRUCTION UNITS FOR A SELECTED NUTRIENT
FOR HIGH SCHOOL

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CHAPTER I

INTRODUCTION

Significance of the Problem

Today, home economics teachers are confronted with unparalleled challenges and opportunities in both the planning and teaching of nutrition programs. Even though nutrition education has been and continues to be a part of the homemaking curriculum, there is little evidence that the food habits of young people have improved (Dwyer, Feldman and Mayer, 1970).

The lack of effectiveness in teaching nutrition has been a major concern of nutrition educators. This evidence has been supported by authorities in the area of nutrition research on health knowledge of students and dietary studies (Sipple, 1971), (Dwyer, 1970), (Food and Nutrition, 1973).

In a report on the 1969 White House Conference on Food, Nutrition, and Health, Mayer (1969) states:

Nutrition education is of paramount importance in a national scheme. Previous efforts in nutrition education have been largely ineffective, and most Americans today are abysmally ignorant about the most elementary principles of applied nutrition (p. 500).

The lack of effectiveness of home economics classes in nutrition was discussed in the Dwyer, Feldman and Mayers study (1970). On a test measuring knowledge, the relatively low difference between test scores of girls and boys indicated that the girls' extra-training

in home economics was not extremely effective in increasing their level of knowledge in the test area of nutrition.

Because there appears to be a lack of effectiveness in teaching nutrition, it is believed that a study to develop individualized instruction units and to evaluate the effectiveness of these units for teaching selected areas of nutrition in home economics classes at Charles Page High School was a desirable research endeavor.

Statement of the Problem

The purpose of this study was to develop individualized instruction units and to evaluate the effectiveness of these units, at different ability levels, for teaching selected aspects of food and nutrition to girls who are juniors and seniors in home economics classes at Charles Page High School in Sand Springs, Oklahoma. The objectives of the study were:

1. To review basic nutrition information to identify concepts of carbohydrates in food and nutrition.
2. To develop an individualized instruction unit on carbohydrates, to teach juniors and seniors in high schools.
3. To determine the effectiveness of the individualized instruction unit through pre-test and post-test design, and the relationship of the scores using the criteria of intelligence quotient with below average students, average students, and above average students.
4. To determine student acceptance of individualized instruction as a method of instruction in food and nutrition.

5. To make recommendations for the utilization of this method of instruction as a model for the development of similar learning units for other nutrients.

Limitations of the Study

This study will be limited to:

1. Development and use of individualized instruction units in a selected subject matter area, namely carbohydrates.
2. Development and use of 35 mm slides and a cassette tape.
3. Evaluation of the units by two Home Economics IV classes, totaling thirty students.
4. Testing for cognitive levels of learning of the students only after completion of the units with no retention test.
5. Junior and senior high school girls enrolled in Vocational Home Economics IV, at Charles Page High School, Sand Springs, Oklahoma.

Assumptions

1. Students enrolled in the home economics classes at Charles Page High School represented diversity in socio-economic background, and these students were representative of the female population of Charles Page High School.
2. It was assumed the students in these classes represented different levels of ability that could be measured accurately.
3. It was assumed that the tests and opinion survey were completed with honest answers.

Definition of Terms

Individualized instruction - a type of multi-dimensional program where instructional techniques and methodology are varied (A Conception of Individualized Instruction, 1972).

Objectives - an identification of performance that will be accepted as evidence that the learner achieved an intended outcome (Mager, 1962).

Pre-test - a series of questions that measures the knowledge of an individual before an independent variable was applied (Good, 1963).

Post-test - a series of questions that measures the knowledge of an individual after an independent variable had been applied (Good, 1963).

Intelligence quotient - a number indicating a person's level of intelligence as shown by an intelligence test (Ahmann and Glock, 1967).

Average intelligence - an intelligence quotient between the numbers of ninety and one hundred and ten as determined by the Otis Quick Scoring Mental Ability Intelligence Test (Ahmann and Glock, 1967).

Above average intelligence - an intelligence quotient one hundred and eleven or above as determined by the Otis Quick Scoring Mental Ability Intelligence Test (Comparative Test Scores, 1964).

Below average intelligence - an intelligence quotient eighty-nine or below as determined by the Otis Quick Scoring Mental Ability Intelligence Test (Comparative Test Scores, 1964).

Audio-visuals - materials that provide instruction through sense perception.

Procedure

The following procedures were used in this study:

1. A review of related literature was conducted to identify concepts of carbohydrates in food and nutrition appropriate for junior and senior high school students.
2. A review of related literature on audio-visuals was conducted to identify concepts in audio-visual instruction.
3. Behavioral objectives were identified from the concepts on carbohydrates to be included in an individualized instruction unit utilizing audio-visual slides and cassette tape.
4. A three-part 35 mm slide presentation on carbohydrates was developed according to identified objectives.
5. A pre-test and post-test was written according to identified behavioral objectives for the purpose of evaluating the program.
6. For the purpose of evaluation, the individualized instruction units, utilizing the 35 mm slides and cassette tape, were presented to junior and senior high school girls who were enrolled in study hall. A recorded oral interview was the evaluation method utilized. These students were paired with the control group on the basis of age and intelligence test scores.
7. On the basis of the information gained from the recorded interviews changes were made in the pre-testing procedure and in the form the tapes were presented.
8. The pre-test was then administered, in a group, to all students enrolled in second and fifth hour Vocational Home

Economics IV classes. They were then asked to choose a time that was convenient for them to complete the individualized instruction units by the slide-tape method.

9. Post-tests were completed by each student immediately after viewing the slides as a part of the individualized instruction procedure.
10. A comparison of the results of each individual's scores on the pre-test and post-test and the results of the whole group scores was computed according to the pre-test and post-test results.
11. Individual's scores were compared with her ability group, below average intelligence, average intelligence, and above average intelligence.
12. Recommendations for the development of similar teaching units on other nutrients were made based upon the findings and analysis of this study.

Organization of the Study

This developmental study was organized into five chapters. Chapter I included introduction and significance, a statement of the problem with a description of the objectives, limitations of the study, assumptions, definitions of terms, procedures, and organization of the study.

Three areas of related literature are discussed in Chapter II, Nutrition Education, Individualized Instruction, and Audio-visual Information Transmission.

Within Chapter III will be presented a selection of the subjects, organization of content, development and production of slides and tape, development of individualized instruction materials, development of pre-test and post-test, presentation of individualized instruction units to pilot group and presentation of individualized instruction units to controlled group.

Analysis of the data used in the study is found in Chapter IV. The summary, conclusion and recommendations will be given in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

History of Nutrition Education

National Conferences on Nutrition has been a recurrent theme in the United States since 1941. The first conference in the United States, was the National Nutrition Conference for Defense, 1941 (Eppright, Pattison and Barbour, 1963). Several indications of widespread nutritional problems, prompted President Franklin D. Roosevelt to call for the first national conference. Among the disclosures concerning nutritional problems was that only one-third of America's population were well fed. Furthermore, dietary deficiency, such as pellagra, was prevalent in the South. The rejection of a large number of physically unfit draftees added even greater importance to the urgency of this conference (Eppright, Pattison and Barbour, 1963).

From the 1941 conference twelve recommendations were announced and many of these recommendations remain relevant guides to current programs of nutrition education for today. Although none of the twelve recommendations were specifically aimed toward teenage or adolescent nutrition, nutrition education for the total population was a major concern. Two of the twelve recommendations that emphasized education were:

1. More widespread education of doctors, dentists, teachers, social service workers, public health

nurses, and other professional workers in the newer knowledge of nutrition.

2. Mobilization of every educational method to spread the newer knowledge of nutrition among laymen (United States Department of Agriculture, 1967, p. 225).

The second nutrition conference, entitled the National Food and Nutrition Institute, was held eleven years later (United States Department of Agriculture, 1959). The purpose of this 1952 Institute was to consider and redirect programs in nutrition in order to cope with new problems which had developed due to changes in economic and cultural conditions. In contrast to the first conference concerned chiefly with the ill-fed population, this conference dealt with over-weight and obesity as a major area of concern. Furthermore, clinical studies conducted between 1941 and 1952 indicated that incidence of deficiency diseases had substantially decreased since the first conference. However, symptoms of loss of vigor, retarded growth in children, low resistance to infection, increased tooth decay and abnormal births, indicated that poor nutrition was still in existence (Eppright, Pattison and Barbour, 1963).

Education was the major emphasis of the third nutrition conference held in 1957 (United States Department of Agriculture, 1959). This National Nutrition Education Conference was primarily concerned with a nation-wide survey of food consumption and was conducted in 1955 as recommended by the 1952 conference (Nutrition Survey Highlights, 1973). The major findings of this survey were that (1) high income families needed nutrition education as well as middle and low-income families, and (2) particular groups of individuals such as senior citizens, teenagers, and pregnant women continued to have nutrition

problems despite the availability of nutritious foods (Nutrition Survey Highlights, 1973).

In 1962, the fourth Nutrition Education Conference emphasized children's diets, obesity, dental health, and the social and emotional aspects of food habits. During this conference Leverton stressed the following concerns in nutrition education:

1. Imbalance between the amount of food energy needed and the amount supplied by the diet, especially in teen-age girls,
2. Imbalance between the need for food and the many opportunities to consume food: imbalance between the energy yield of many food in relation to their nutritive value, and
3. Imbalance between opportunities to make choices of food and the training and experience with which children have been equipped to make wise choices (Epwright, Pattison, and Barbour, 1963, p. 233).

Prior to the White House Conference on Food, Nutrition, and Health, 1969, Congressional hearings were conducted. These hearings indicated that serious hunger and malnutrition existed in the United States (Mayer, 1969). Congress directed the Department of Health, Education, and Welfare to determine the scope and location of these health problems. This Department initiated the Ten State Nutrition Survey (Nutrition Survey Highlights, 1973). The data in this survey included information on dietary intake, clinical and anthropometric measurements, dental and biochemical data, and general demographic information collected from approximately 40,000 individuals.

Major findings of the Ten State Nutrition Survey were:

1. A significant proportion of the population surveyed was malnourished or was a high risk of developing nutritional problems,
2. There was an increase of malnutrition as the income decreased,

3. Adolescents between the ages of 10 and 16 years of age had the highest evidence of unsatisfactory nutritional status and male adolescents had more evidence of malnutrition than females,
4. The number of years of school completed by the person usually responsible for buying and preparing the family's food was related to the nutritional status of children under the age of 17,
5. Persons over sixty showed evidence of gradual undernutrition,
6. Poor dental health was found. High carbohydrate diets of adolescents was associated with the development of dental cavities,
7. School lunch programs were found to contribute a substantial proportion of the total nutrient intake of many school children,
8. Obesity was identified as a significant health problem, and
9. Intakes of iron and vitamin A were found to be significantly low (Nutrition Survey Highlights, 1973, p. 14).

The results of this survey coupled with news publications and a Central Broadcasting System television documentary report, prompted President Richard M. Nixon to call the 1969 White House Conference on Food, Nutrition, and Health. The main purposes of this conference were: to lay a foundation for a National Nutrition Policy and to advise the President on the best methods to eliminate hunger and malnutrition in the United States. The other aims of this conference were to awaken the public to these problems and to motivate them to seek actions on the recommendations made by the conference participants (United States Department of Agriculture, 1971).

Areas in which the conference focused attention were:

1. Surveillance and evaluation of nutritional status and diet,
2. Guidelines for the nutrition of vulnerable groups,

3. Provision of food as it affects the consumers,
4. Nutrition teaching,
5. Delivery of food as a system, and
6. Voluntary action (Mayer, 1969, p. 499-501).

Nutrition Education in Oklahoma

Food and nutrition education constitutes an area of study in Vocational Home Economics classes. Nutrition is taught in Homemaking I through IV either as a separate unit of study or as an integrated subject. In some schools vocational home economics teachers devote one hour of their teaching schedule each day to nutrition education in homes, school, and community where they are employed.

A food habits survey in Oklahoma was directed by the Oklahoma School Lunch Division in 1966 (State Department of Education, 1966). The Food Habit Survey of school children, ages five to 18, represented 10,000 children from every economic section of the state. Three levels of income were represented in this study: Families with less than \$3,000 yearly income, families with \$3,000 to \$7,000 yearly income and families with more than \$7,000 yearly income.

The comparison of data from high income levels with those of low income levels revealed that the need for nutrition education is as great for those in high income levels as it is for those in low or moderate income groups. From this research it is reported that from a four day period no single student consumed foods from all the food groups. Moreover, evidence of inadequate intakes of calcium, iron, vitamin C and vitamin A were reported. Although it was found that children who participated in the school lunch program were better

nourished than those who did not, the number of students participating in the lunch program is relatively low. There were 57.5 per cent of the students from 10 to 12 years of age, and 29.2 per cent of the students from 13 to 15 years of age who participated in the school lunch program.

Utilizing the same instrument as designed for the Oklahoma Food Habit Survey in 1969, Rogers completed a survey of high school students in Howe, Oklahoma (Rogers, 1969). Rogers' objectives for the research were to survey students to determine nutritional inadequacies and to plan a nutrition education program that would help overcome these inadequacies.

Data from Rogers' research supported the findings of the survey made by the State of Oklahoma. Rogers' study further reported that only a slight improvement in food habits occurred after a nutrition education program was presented to the students.

Studies of Teen-agers

Teen-agers through the country appear to have similar dietary problems. The two largest surveys on American teen-agers were the Ten State Nutrition survey and the 1965 Household Food Consumption Survey. Both surveys reported that consumption levels of vitamins A and C were less than desirable.

Hampton, Huenemann, Shapiro and Mitchell (1967) reported girls were most deficient in the nutrients calcium and iron. The caloric intake for these teen-agers varied greatly from one individual to another with the greatest contribution of calories represented in the dairy group, followed by the meat group. "Obese boys and girls

tended to eat something from the fruit and vegetable food groups on fewer days than did the others" (p. 385).

Commenting on the nutritional status of youth, Huenemann (1971) stated:

...we have no information as yet on the nutritional status of American teenagers as a whole, and ... studies of groups indicate tremendous variation in measures of nutritional status and tend to support the view that there is a proportion of the teenage population, it is hard to say how large, with nutritional problems. The major problems appear to be dental caries, obesity, anemia in girls and in some boys. Less than desirable levels of vitamins A and C have been found in some teenagers (p. 37).

Nutrition Education for Teen-agers

Nutrition education for today's and tomorrow's homemakers, means providing opportunities to learn about nutrition that is applicable to their way of life (Wheat Flour Institute, 1972). Today's homemakers are confronted with the responsibility of being the nutritionists, purchasing agent, and cook for her self and her family. Moreover, young homemakers no longer learn many of these tasks from their mothers as was traditional in years past. Frequently, the only formal food and nutrition education available to the young homemaker is provided by their junior and senior high school home economics classes, and health classes (Dwyer, Feldman and Mayer, 1970), (Wheat Flour Institute, 1972).

The training girls received in home economics was not considered effective in increasing their level of knowledge on nutrition tests according to Dwyer, Feldman and Mayer (1970). Both boys and girls scored equally low on the test.

In surveying 10,000 high school students, Lantagne (1952) found that on a 300 item questionnaire students ranked nutrition related topics among the top 50 personal health interests. The nutrition topics of highest concern among the girls were, food recommendations during pregnancy ranking twenty-seventh, and nutrition and overweight, ranking forty-third.

Weight control was the only topic related to nutrition which was of high interest as reported by Dowell (1966) in a study of health interest and worries of 360 secondary students in Arkansas. In this study, teachers, administrators, and other professionals in the community were asked to rank observed health problems of adolescents. Neither students, teachers nor professionals in the community regarded nutrition as a high priority area in terms of a community problem which needed to be stressed in school.

A study of "Certain Harmful Health Misconceptions of Junior High School Students Attending Public Schools in Metropolitan Areas," by Harrison and Irwin (1964) indicated junior high school students subscribe to many harmful health misconceptions regardless of sex, grade level, or number of semesters of health instruction. Nutrition rated fourth in five categories of moderate or extremely harmful health misconceptions.

A summary of attitudes toward body weight and dieting behavior was reported by Dwyer and Mayer (1970). Data from this summary was obtained from three surveys conducted on a national stratified sample of the population in the United States from 1950 to 1969. In 1950 and 1956, these surveys indicated that the higher the educational level of the respondents the more likely they were to be dissatisfied

with their weight. Those with less education tended to be less concerned. Moreover, groups which tend to be the least obese are the groups which are most concerned about weight. Dwyer and Mayer concluded that health considerations alone do not motivate proper eating habits.

The relationship between knowledge and practice of good nutrition has often been questioned by researchers when tests of knowledge have been used to determine the effectiveness of teaching methods. Assessments of the effects of knowledge are believed to be more reliable in measuring improvement of dietary practices. Dwyer, Feldman, and Mayer (1970) contended, while studies of both kinds of research are needed to accurately determine the effectiveness of nutrition education, the major rationale for teaching nutrition was that knowledge of nutrition will encourage students to adopt or maintain good food habits. Dwyer, Feldman, and Mayer (1970) further stated:

The association between nutrition knowledge in itself and practices which result in optimal nutrient intakes is therefore one of great significance to educators since it appears that this is the major justification for the continuation and expansion of efforts in nutrition education (p. 65).

The results of a self administered nutritional literacy test was reported by Dwyer, Feldman and Mayer (1970). Students representing forty-two percent of all students in selected urban Massachusetts schools, grades nine, ten and twelve were the subjects in this study. The test was composed of a five item interest questionnaire and a 100 item nutrition knowledge questionnaire. Some nutrition education was required at different grade levels and in health courses, physical education, and home economics. The majority of the students considered nutrition to be equally or less interesting than other parts of health education. The girls' overall scores on the nutritional knowledge

questionnaire were higher than boys. Although their greatest interest was weight control, the girls scored lower on test items dealing with weight loss and gain, energy metabolism and energy output.

Lack of basic nutritional knowledge needed for optimum health has been credited to the incidence of overweight and obesity among adolescents, according to nutritionists (Mayer, 1969). Although nutrition education has been and continues to be taught in vocational home economics and other health related areas, it would appear the current nutritional knowledge levels of the adolescent remains relatively low. Moreover, there is some evidence that indicates that a positive relationship exists between increased knowledge of nutrition and better nutritional practices among adolescents (Curruth and Foree, 1971).

Sipple (1971), presented evidence based on the Department of Agriculture's 1965 Household Food Consumption Survey, that food intake and nutritive value of family diets in the United States showed a drop in the quality of diets compared with the 1955 survey. He further stated:

Up to the present time, no completely effective method for teaching nutrition has been devised. The public has been exposed to a considerable amount of information about foods and nutrition, yet overall food practices have not improved appreciable (p. 18).

Gussow (1973) in a speech presented to the 64th American Home Economics Association, declared the widespread nutritional illiteracy of the American people would seem to be irrefutable evidence that nutrition education was a failure. However, she further contended, that "for some time now it has not been seriously tried."

In a study by Schwartz, Dalrumple, and Vivian (1974), it was found that increased high school education in home economics was associated with levels of knowledge in the area of nutrition among former home economics students.

Since the subject of nutrition has been taught in schools, the lack of nutrition knowledge may be related to the ineffectiveness of some teaching methods. Many different methods have been employed in an effort to facilitate the teaching-learning process in nutrition education in vocational home economics. Among these methods have been: Lecture, group discussion, problem solving, programmed instruction, and audiotutorial systems. Of these methods some were found to be more effective than others depending upon the learning group and other variables (Kline, Barron, and Roberts, 1969).

Knowledge of subject matter may not be the only incentive necessary for an individual to improve his own nutritional status. This is evidenced by the number of persons who have subject matter knowledge but who obviously have dietary problems. Although acquiring knowledge of nutrition is a major objective in nutrition education, it remains to be only one influencing factor among many factors. The others, which may or may not contribute to sound nutritional practices, are physiological and psychological conditions, economic status, physical activity, and influences from one's family and peers. Despite the importance of these influences and the integral part they play in planning a nutrition unit, knowledge of the subject should be the focal point from which learning and application of knowledge evolves.

Individualized Instruction

One need only to look back into history and envision the first methods of teaching, that being individualized instruction. The "one-to-one" method for example, was widely used by Socrates, Aristotle, and Plato. Even apprentice training for certain skills and trades is still in existence today from yester year. It is little wonder that individualized instruction has made such tremendous gain in popularity since we are living in an era of "every one doing his own thing." Appropriately individualized instruction in today's world of education takes on many different names and modes.

This writer has found the definition of individualized instruction to be as varied as the vast numbers of articles written on the subject. Eislee (1971) simply states that "Individualized instruction has reference to the steps taken to meet the needs of pupils" (p. 16). Eislee cautions teachers not to confuse individualized instruction with independent study because isolating students as in independent study for all of their formal education is not desirable.

The Educational Product Report No. 46 (1972) discussed three principles to consider in selecting or developing instructional materials in individualized instruction. First, individualization is multi-dimensional, that is, a particular package or curricula can be individualized in some ways and not in others. Secondly, the degree of individualization is in the usage of the materials by the individual student. The final principle explains that all learning is individualized to some degree, for each student enters the learning process influenced by his own ideas and experiences.

Traditional models in individualized instruction include Selection, Enrichment, and Acceleration. The Selection Model is not acceptable to most educators because it is basically a defeatist philosophy since there are two routes in the model and if a student digresses from one to another he is not allowed to return to his original position. This model for instruction is used in higher education in Europe (A Conception of Individualized Instruction, 1972).

Enrichment and Acceleration are the Models most widely used today. Both Models contain a series of activities with pre-test and post-test criterion. In the Enrichment model all students begin and end the unit of study at the same time. The Acceleration model allows the student to progress at his own speed (Scanlon, 1970).

The Diagnostic Model of individualized instruction is one of the most recent Models developed. Students are given a diagnostic test to access the entry level of the student before he begins instruction. This Model is particularly beneficial in hierarchial units. A student's progress is measured after each unit, and if he fails, he is recycled through the unit before proceeding on to the next unit (Eash, 1969).

Many individualized instruction units require the use of audio-visual equipment, tape recording equipment, independent study areas, and other student materials to be used in the individualized instruction program. Due to the cost of these items, an educational administration may be willing to finance an individualized instruction program for only part of its student population (Wittkopf, 1972). Harper (1973) discussed three approaches to the selection of students to participate in individualized instruction. The first approach was to individualize instruction in advanced courses. The second was to individualize

instruction in first year courses. The latter approach was used by Murphy (1969), and Short (1970) in beginning foods classes. Finally another approach was to select students according to their mental ability. Frank and LaLeike (1973) reported selecting students according to mental ability and found that selection according to mental ability was most effective in a beginning foreign language class. Beginning French students at Tarrant County Junior College, Fort Worth, Texas, were subjects in a study utilizing individualized instruction by Harper (1973). Students in the upper one-third and those students in the lower one-third of the group in mental ability made significantly more progress in speaking, reading, and writing than did a control group taught in a conventional class.

Individualized Instruction In Home Economics

A selected review of literature on individualized instruction revealed several studies in a variety of subject areas. There were several studies in the areas of science and mathematics on the college level. This writer found a limited number of studies in the general area of home economics on the college and high school level, and very few specifically in the area of food and nutrition on the secondary level.

The development of self-instruction laboratories to replace the traditional food laboratories originated at Syracuse University (Nelson, 1966). A variety of self-pacing instructional units were developed using slides, film loops, and audio tapes. It was found that students enjoyed the multi-media approach, and acceptance for the unit was reflected in the student behavior; that is, they were

more attentive and were able to progress with less confusion in the food laboratory than students taught in traditional laboratories.

Short (1970) reports a self-instruction laboratory in beginning Nutrition and Food Science at Syracuse University. At the beginning of each semester students are pre-tested on laboratory and lecture materials in the course. Only 5 percent of the students are allowed to advance through one or more of the conceptual units. After completing each self-instruction sequence, the student takes a ten item post-test (approximately 97 percent of the students score 80 percent or more on the test). When one sequence is successfully completed the student proceeds to the laboratory to prepare the product. The nutrition section of the program is presented by using a computer. The student types one key word on a card and is given information on the printout. She may be given a question by the printout or may be branched to other information depending on her response to the question. While a total evaluation of the effects of the program are still being studied, the initial response and attitude of the faculty and students indicate the program is successful.

Murphy (1968) developed three programmed modules for beginning courses in Foods at Oklahoma State University. She found that freshmen students who used the programmed modules made considerable gain when their pre-test and post-test scores were compared.

Harden and Lamb (1970) reported a study using bioassay demonstrations in the Department of Food and Nutrition at Texas Tech University. This program was undertaken to determine whether students acquired specified concepts about an animal feeding demonstration. One instructor presented the demonstration in its entirety, and audio-

visuals and tactile perceptions were utilized. The combined presentation of slides and programmed instruction were presented to 465 students at the first session. After the slide presentation, 12 female albino rats were assigned to four diets according to matched weights. At two-week intervals for three class periods students observed and recorded the physical appearance of the animals. When the study was completed each student submitted a brief scientific report according to specifications which were presented in the slides. A 40 item multiple choice test was given to measure levels of learning in knowledge, comprehension, and application. Correct responses on the test ranged from 74.35 to 93.94 percent. Student and instructor responses to the program were highly favorable.

A self-learning unit for patients with diabetes was developed by Tani and Hankin (1971). This unit featured color slides with synchronized tape recording that were based upon the principles of programmed learning. Three groups of diabetic patients were used in the study, a control group and two experimental groups. The control group of eight patients, received the original counseling by the dietitian, which included dietary history, translations of dietary prescriptions into exchange units, and general principles of dietary management. The first experimental group of nine students were treated as the control group except the dietary management was omitted. The patients were referred to an audio-visual laboratory where they used visual aids. The worksheet responses of the second experimental group were the basis for revision on the slide tape presentation. From this session, the third group reviewed the revised slide presentation. The mean scores on a questionnaire were similar. The mean score for the

control group was 85 as compared to a mean score of 89 for experimental groups two and three. It would appear that the programmed instruction method was at least equal to the conventional teaching method. A major finding of this study was the saving of the professional dietitian's time. The dietitian averaged about one hour visiting with the control group and about thirty minutes for each student in the experimental groups.

Ogilvie (1969) developed samples of educational media for Food and Nutrition classes to teach boys. This developmental study included 8 mm film loops, programmed instruction, and slide series programs. With these instruments Ogilvie surveyed twenty teachers in modular scheduled high schools in Colorado, New Mexico, and Oregon. Her purpose was to determine the types of media and methods being used, the effectiveness of the media presently being used, and the kinds of programs teachers felt were needed in teaching boys' food and nutrition classes. The twenty teachers who participated in the survey felt that programs which were used to teach the boys' classes were difficult to locate, poor in content, and unrelated to the needs and interests of the high school boy. The majority of the teachers indicated an interest in having sample programs developed for their use in boys' classes.

Fuller (1972) developed and evaluated a learning tape for teaching basic food preparation skills that blind students would need in order to perform as homemakers. Some of the skills that were taped included measuring sugar, water, flour and shortening. She found that blind students can follow taped instructions. Of the five students who tested the tape, the lesson was completed in less than fifty

minutes with little teacher assistance. Verbal evaluation of the tape by the students was very favorable.

The development of self-instructional modules for Hospitality Education was reported in a speech by Wayda at the 1973 American Home Economics Association Annual Meeting. This self-instructional module which was developed at Pennsylvania State University, is now being utilized in a two-year hospitality education degree program. Wayda (1973) stated:

While I don't contend that the TIPS concept, or even our general approach to self-instructional modules learning at Penn. State, could supplant all the traditional forms of instruction, I do think our system should facilitate the teaching of a wide variety of home economics subject matter conducive to the seminar-practicum format (p. 6).

Audio-Visual Information Transmission

The writer has reviewed selected literature in audio-visual communications which appeared to be most applicable to visual slide and tape communications. The stimulus conditions discussed in the following pages are visual perception, embellishments, and narrations.

Audio-visuals have long been recognized as a valuable aid to the educator by providing a mode of duplicating lifelike situations in the class room. In order to develop and utilize audio-visual materials effectively however, an understanding of the stimulus conditions that influence the learners is of paramount importance (Dale, 1954).

Pictorial materials serve two main purposes in the learning situation. One function is motivational and the other informative (Wittich and Schuller, 1967). French (1952) studied children's preference for pictures of varied complexity. The children ranged in age from six to eleven years of age. He found that children displayed

a progressive change from simple to complex illustrations until they are old enough to understand them. Travers (1957) cited a study by Rodriguez Bou in 1950. The study was made of 2,492 second, fourth, and sixth grade school children. Three illustrations, all depicting the same scene were used in this study. The most realistic illustration was preferred by forty six percent of the students, thirty two percent preferred the second illustration, and twenty two percent preferred the least realistic illustration. Smith (1959) concluded that adults demonstrate a preference for reading material containing illustrations and also prefer pictures related to their own interest.

Embellishments are used to add realism or arouse interest to a visual display. Color and music are two embellishments often used for the purpose of arousing interest, and in many instances, are not relevant to the message that the audio-visual instructional device is designed to convey (Travers and Others, 1967).

In a viewer preference type study, Miller (1936) found that elementary school children, when given a choice between two and three-color illustrations, preferred the three-color pictures because of their realism. Black and white illustrations were considered less realistic. Rudisill (1951) investigated the significance which kindergarten to sixth grade children attach to color and to other qualities which give illustrations an appearance of realism. Five forms of illustrations which occur in childrens' books were used in the study. These five forms of the illustration were reproduced in five different art forms: a colored photograph, an uncolored photograph, and three water-color drawings. One watercolor drawing was both realistic in form and color; another was realistic in color, but

unrealistic in form. The last watercolor drawing was both unrealistic in form and color. The findings of this picture preference study indicated that the lower grades were in favor of a colored picture rather than an uncolored one. The higher grades preferred an uncolored picture giving an impression of reality over a colored one which did not conform to reality. The chief conclusion drawn from the study was that whether pictures were colored or uncolored was less important than the quality of realism. A color preference study was made by VandeMeer (1967) using 199 high school students. Four color films and their counter-parts were used in the study. A pre-test and post-test on the learnings were administered but without a delayed recall test. The results of the study indicated insignificant differences existed between black and white and color films on immediate recall post-test. Color films, however, received preference over the black and white versions. VandeMeer concluded from the findings of his study that color did not appear to be as significant as a condition facilitating factual learning. However, as indicated on preference scales, learners generally preferred color films to black and white.

Music is an embellishment often used in audiovisual materials primarily to produce either arousal or emotional responses. Travers (1967) emphasized that "...music is included in films partly because of a tradition established by its use as an accompaniment to pictures and it is often provided without any specific objective" (p. 469).

Neu (1959) tested five training films on introductory machine shop instruments. The five versions of the film included: (1) a simplified presentation of the subject matter, (2) additional relevant

visual materials, (3) additional irrelevant visual materials, (4) relevant auditory materials such as noise from a machine shop, and (5) music as an irrelevant auditory material. The subjects for the study were 2,631 army recruits divided into six groups. Five groups were shown one of the five versions of the training film, and the sixth group served as the control group without being shown any films. Neu (1959) reported an increase in learning occurred as indicated by pre-test and post-test analysis, among the five groups who viewed the films. The mean scores for the groups who viewed the film were between one and two standard deviations higher than the mean score of the control group that did not see the films. Neu (1959) further reported that evidence indicated the irrelevant sounds such as music and noise of the machine shop distracted from the teaching effectiveness of the film.

Travers (1967) generalized the procedures which elaborate the process of transmitting information, either by embellishment or by other devices, does not facilitate reception. Travers (1967) felt this was because the human receiver does not have the capacity for utilizing this added information.

Some effects of variations in narration on comprehension were identified by Allen (1957). Some of these variations have been summarized below:

1. Comprehension and information transmission of audio inputs can be predicted by readability formulas used to measure their difficulty.
2. Verbalization is better than no verbalization when verbal information is being presented and later tested.

3. Listening comprehension is likely to be most effective at speeds of around 160 words a minute.
4. There appears to be an optimum rate of transmitting verbal information. Slow speeds are generally favorable, however, they can be too slow.
5. When a narration is accompanied by video tape the optimum rate of comprehension of the narration appears to be lower.

Allen (1957) appeared to reinforce Travers (1967) generalization about the rate at which information can be transmitted effectively to the human receiver. He added, "This human receiver is limited and cannot be increased by using more than one sensory channel or more than one source of communication" (p. 136).

Summary

The need for effective teaching methods has been and continues to be a major concern of nutrition educators. Although National Nutrition Conferences have emphasized different nutritional problems affecting America's population, nutrition education has also received recurring emphasis in most of the conferences.

According to the dietary studies reviewed, similarities in dietary intakes among America's teen-agers were noted. Among the major nutritional problems noted in these studies were dental caries, obesity, anemia, and less than desirable levels of vitamins A and C.

Teen-agers were concerned about selected aspects of their health. These areas included diet during pregnancy, overweight, and obesity. There was evidence to indicate that the current nutritional knowledge

levels of adolescents are relatively low despite the fact that nutrition education is a part of most home economics and health curriculums.

Studies of the effectiveness of existing methods being utilized in nutrition education fail to suggest any one teaching method as completely effective in aiding the learner. Individualized instruction is one method of instruction proposed as an alternative approach to instruction in nutrition education.

Studies utilizing a variety of self-instruction laboratories, and programmed modules indicated that individualized instruction has been effective in teaching some areas of nutrition. Student acceptance of individualized instruction and conserving time for some instructors were cited as advantages of this method of instruction.

Individualized instruction often utilizes audio-visuals since lifelike situations can be duplicated in the class room. Illustrations can be brought into the class room in visual form which would otherwise be impossible.

CHAPTER III

PROCEDURE

Selection of Topic

Included in this chapter are the: (1) selection of subject area; (2) organization of content; (3) development and production of slides and tape; (4) development of individualized instruction materials; (5) development of pre-test and post-test; (6) presentation of individualized instruction units to pre-test group; and (7) presentation of individualized instruction to controlled group. Results of the presentation will be presented in Chapters IV and V.

The nutrient, carbohydrate, was selected as the subject area for development for two main reasons. First, the writer had recognized a need for supplementary teaching materials to assist students in identifying the wide variety of carbohydrate foods. Secondly, measures of nutritional status have indicated that there is a high proportion of the teenage population with nutritional problems, involving anemia, dental caries, and less than desirable levels of vitamins A and C (United States Department of Agriculture, 1971). All of these problem areas are associated and/or linked to some degree with carbohydrate foods. For example some carbohydrate foods in contact with the tooth surface for a period of time provides a favorable medium for the growth of bacteria. Furthermore, obesity, which is a major concern of teenagers, is caused by an intake of calories beyond

the body's need for energy. One gram of carbohydrate foods, yields approximately four calories. Although fruits and vegetables are classified as carbohydrate foods and they vary widely in their carbohydrate concentration, many fruits and vegetables are primary sources of iron, vitamin A and vitamin C.

After identifying the nutrient, carbohydrate, as the subject area to be developed, general objectives for the teaching unit were selected. The following objectives were developed in relation to the unit of individualized instruction on carbohydrates.

1. To develop a broader understanding of the nutritive value of carbohydrate foods and the utilization of these foods by the body.
2. To develop an understanding of nutrition and its influence on personal appearance, and physical and mental efficiency.
3. To develop some ability in recognizing inadequacies, such as excessive or imbalanced intake of carbohydrate foods and adjusting these inadequacies from combinations of foods generally available.
4. To develop some ability in recognizing that carbohydrates are needed by all individuals in varying amounts as influenced by age, sex, size, activity, climate, and physical condition.
5. To develop some skills in identifying nutrients needed by the body and their food sources.

Organization of Content

An extensive review of literature was made to determine the subject content of the unit. In the beginning six topics were selected: Kinds of Carbohydrates; Contribution of Carbohydrates to the Diet; Other Nutrients Found in Carbohydrate Foods; Requirements for Stages of Life; Principles of Selection and Storage and Principles of Carbohydrate Cookery. Only the first three topics were developed for this study. These topics were selected because they were not deemed most important but because they were considered basic subject matter in a sequential program of instruction.

The writer began by organizing the subject matter in an outline form, stating facts in paragraphs, in order of presentation after each heading, see Appendix A, page 60. These facts were representative of the general objectives previously stated.

Organizing the subject matter in this manner proved to be very helpful when writing the script. Each paragraph or combination of paragraphs was adapted to each frame of the slide presentation. The narration for each frame was typed on the bottom third of an eight by five inch index card. These cards were collated vertically with tape, accordian style. On the upper two thirds of the card, a drawing illustrating the script was sketched. This method of organization was adaptable to work on frames singularly or consecutively. Furthermore, the conciseness of the cards proved advantageous in that they were easily carried.

Development of Slides

The basic equipment used to photograph the slides was a 35 mm single-lens reflex camera, a set of close-up lenses, and a tripod. Blue-coated photoflood lights number B-2 were used when photographing still life subjects. All other slides were taken either in existing light or day light conditions. Due to the variety of lighting conditions used in photographing the slides, High Speed Ektachrome daylight type film was used to photograph all slides.

Four methods of preparing materials for photographing were utilized. Title slides were photographed on poster board, size twenty-two by twenty-five inches, with three inch ceramic letters. Clear acetate sheets were used when a figure or drawing was photographed more than once. The outline of the object or figure was outlined in black acetate ink. For variety, the acetate sheets were then placed over colored construction paper for emphasis and were then colored in with colored acetate pens on the opposite side of the black drawing. Deca Dry Transfer letters adhered well to the acetate surface. Actual food items were used in the slides requiring pictures of food, bounce lighting was utilized to reduce glare and shiny spots. Copying pictures was the fourth method of photographing materials utilized in this study. Pictures from books and magazines were placed on a level surface near a north window exposure. By using close-up lens and a tripod, copies were made from very small prints.

Development of Cassette Tapes

The cassette tape was selected for use in the individualized instruction units because of its simplicity in operation and

compactness in storage. Since the tape was permanently enclosed in a case there was less opportunity for damage to occur due to scratches or breakage.

Narrations for the three individualized instruction units were first recorded on a seven inch reel-to-reel master tape. Back-ground music was added to the master tape to add variety and to create interest. Finally, the master tape was recorded on three fifteen minute cassette tapes. The actual recorded narration varied in length: Part I - Kinds of Carbohydrates, was six minutes long; Part II - Contributions of Carbohydrates, was five minutes in length; and Part III - Other Nutrients in Carbohydrate Foods, was three minutes in length.

Developing Individualized Instruction Materials

Individualized instruction is a scientific method of planning and executing instructional materials (Eash, 1969). Even though it encompasses a variety of titles and many different modes, there are some variables that are characteristic to most kinds of individualized instruction.

Eash (1969), in his article "Assessing Curriculum Materials: A Preliminary Instrument," has identified some of these variables which this writer has summarized below:

1. Selection of objectives are a fundamental part of individualized instruction. They should be explicitly stated in terms of expected student behavior.
2. Since individualized instruction is directed toward individuals, the materials should be developed with a specific population in mind, such as age groups,

grade levels and/or interest of a particular group.

3. The selection and arrangement of the content of the material determines the structure of the unit.
4. The scope and sequence of individualized instruction varies according to the type of model being utilized and the subject matter being taught. For example, acquiring knowledge of measuring techniques would precede cake baking methods.
5. Branching and recycling are characteristic of programmed instruction. The program may be a linear type or it can be multiple routes. Programmed instruction is designed to allow the student to respond frequently to stimuli and his responses are immediately reinforced through the knowledge of the results.
6. The learning environment depends on the particular model being utilized. Learning centers are frequently used either by the individual student, small groups or very large groups.
7. The time variable for mastering the instructional materials varies from fixed to very flexible. The fixed variable is usually based upon past performance of similar groups.
8. Many different modes may be present in any model of individualized instruction. Some modes frequently utilize auditory, tactile and visual methods. These modes appear singularly or in combination.

9. Two kinds of evaluation common to individualized instruction are norm-referenced and criterion-referenced. The objectives of the unit would determine the type of evaluation that would be appropriate.

Keeping these variables in mind, the writer began writing the individualized instruction materials by organizing the information in the following order: introduction, objectives, pre-test, technical instructions, slide-tape presentation, and self-administered post-test.

Three sections were developed for this study. These sections included: Kinds of Carbohydrates, Carbohydrates and Their Contribution to the Diet, and Other Nutrients Found in Carbohydrate Foods.

In the first section, carbohydrates were presented according to the three kinds, monosaccharides, disaccharides, and polysaccharides. The relationship of carbohydrates to other essential nutrients and food sources of carbohydrates were also emphasized. See Appendix B, page 66.

Carbohydrates as the major source of energy was emphasized in the second part of the slides. Other contributions that carbohydrate foods make to the diet were also discussed. See Appendix C, page 74.

The third part of the series emphasized the four main food groups where carbohydrate foods are found. Other essential nutrients found in carbohydrate foods were discussed. See Appendix D, page 80.

Development of the Pre-Test and Post-Test

A pre-test and post-test was developed for each unit. See Appendix E, page 85. These tests, identical forms, test-retest, were based on the specific objectives included in each unit. The kinds of

items included in the test were: true and false, check list, discussion, matching, completion, and listing items. Part I contained fifteen items with forty seven possible correct answers. Part II and III contained seven items with eighteen and twenty five possible correct answers, respectively.

An explanation of the pre-test was included in the materials given to the student at the beginning of the individualized instruction unit. See Appendix E, page 86. They were encouraged to express themselves honestly because the test was only a means of obtaining some information, not to be used for grading purposes.

Presentation of Individualized Instruction

Units to Test Group

The three individualized instruction units on carbohydrates were presented to a test group of students who were enrolled in study hall at Charles Page High School, in Sand Springs, Oklahoma. This group was comprised of three juniors and four seniors. All students had previously been enrolled in Home Economics I and II. Two of the senior students had completed Home Economics III during their junior year. They were chosen from a group of twenty-one students who volunteered to participate in this study.

The Otis Quick-Scoring Mental Ability Intelligence Test scores for these students ranged from sixty nine to one hundred and thirty. This range was within the range of intelligence quotient of the research students used in the final study.

During the pre-test, the individualized instruction unit was presented to the students individually in the Home Economics department.

They all were chosen to participate in the study to advise the writer of any part of the units that were unclear and to make recommendations for improvement. Furthermore, their personal opinions concerning their likes or dislikes of this method of instruction were elicited.

After each student completed the three individualized instruction units, they were interviewed individually. The responses of this small group of students were both interesting and informative. One major problem discovered in the individualized instruction unit was the narration on the cassette tape. All students expressed dislike for the background music on the tapes, and three of the students indicated the narration was too fast. As a result of these findings, the script was recorded again at a slower speed and all music was eliminated.

Another vital discovery observed by the writer was that three students searched for the answers to the pre-test in the written script included in the individualized instruction units. This prompted the writer not to include the pre-test in the student materials, but rather to administer the pre-test to all participants during a class period.

Presentation of Individualized Instruction

Unit to Controlled Group

Special emphasis classes in Foods and Nutrition were taught on the Home Economics IV level to students who previously have been enrolled in Home Economics I and II classes. The course content emphasized equipment, safety and sanitation, meal management, and nutrition. See Appendix F, page 97. The length of time devoted to this unit was nine weeks with approximately three weeks of this time period allocated specifically to nutrition.

The nutrition section of this Home Economics IV class was taught by the traditional lecture method except for the individualized instruction materials on carbohydrates. The writer began the individualized instruction unit on carbohydrates by administering a pre-test for all three individualized instruction units to all students enrolled in second and fifth hour home economics classes. Each class was informed that this was not a test but rather an instrument to obtain some information about what they already knew or thought about a particular topic. Furthermore, the pre-test had nothing to do with their grade, so they could feel free to express themselves honestly.

The pre-test for Part I - Kinds of Carbohydrates was distributed and then collected after each student was finished. The pre-test for Part II and III were administered in the same manner. All of the students completed all three of the pre-test in less than forty five minutes. No time limit was set for the testing period.

After the pre-test for all three individualized instruction units had been administered, the students were instructed to choose two time periods, during the school day, that was convenient for them to complete the individualized instruction by slide-tape method. The subjects were also instructed to report to the home economics living room on the days and hour they had selected. At that time they would view the slides and listen to the tape. If they had questions about the procedure, there would be a student aid in the room to assist them.

When the student reported to the area designated for presentation of the individualized instruction units, she was given a packet which contained a brief introduction to that particular unit, objectives

which were stated in behavioral terms, technical instruction for operating the slide projector and cassette tape recorder, and a written narration. There were written instructions at the end of each unit directing the student to return the packet to the investigator and obtain and complete a post-test. See Appendix B, page 73.

Summary

This chapter begins by explaining why this particular subject was chosen as a research problem. The development and production of slides and tape, the development of individualized instruction materials, and the development of the pre-test and post-test were also discussed. The chapter concludes with a description of the presentation of the individualized instruction unit to the pilot group and presentation of the individualized instruction to the controlled group. Results of the pre-test and post-test will be presented in Chapter IV. These results include pre-test and post-test scores, range and gain scores from pre-test and post-test, difficulty ratings for both pre-test and post-test items, comparisons of students intelligence quotient with gain in post-test scores, and a student opinion survey.

CHAPTER IV

FINDINGS AND ANALYSIS

The purpose of this study was to develop individualized instruction units and to evaluate their effectiveness in teaching selected aspects of food and nutrition. In this chapter the analysis of the findings in relation to students pre-test and post-test scores, range and gain scores from pre-test and post-test, comparison of students intelligence quotient with gain in post-test scores, and students opinion survey were discussed.

After the individualized instruction units were administered to a test group and revisions were made, they were presented to 30 junior and senior high school students who were enrolled in two Vocational Home Economics IV classes. Pre-tests for all three individualized instruction units were administered to each class. The students were then asked to select two class periods within a three week time period to view the slides and to listen to the cassette tape. Independently post-tests were completed by each student immediately after completion of each unit of individualized instruction. These units were: Part I - Kinds of Carbohydrates; Part II - Carbohydrates and Their Contribution to the Diet; and Part III - Other Nutrients Found in Carbohydrate Foods.

Analysis Of Students' Scores On
The Pre-Test And Post-Test

A pre-test and post-test was developed for each individualized instruction unit according to a table of specifications. See Appendix G, page 105. The raw scores for each unit represents the number of items answered correctly for each unit. Mean scores for the combined pre-test and post-test ranged from 40.16 to 64.90 with a mean gain of 24.74. This data is summarized in Table I. The mean gain indicated the difference in points from the pre-test to the post-test. All students showed an increase in combined scores. These combined pre-test and post-test scores increased from five to 43 points.

Pre-test and post-test items for Part I - Kinds of Carbohydrates, consisted of 15 items with a possibility of 47 correct responses. The range of scores for the pre-test was from six to 32. Post-test scores ranged from 21 to 41. All students gained from three to 30 points on the post-test. The number of students and the number of points gained by individual students is presented in Table II. Pre-test for this unit had a mean score of 17.76, and the post-test score had a mean of 31.56. The gain in mean scores was 14.70.

Carbohydrates and Their Contribution to the Diet was Part II of the individualized instruction unit. The pre-test and post-test for Part II contained five items with 17 possible correct responses. Total correct responses for all students on the pre-test and post-test was 214 and 398, respectively. The number of points increased for the total number of students taking the test was 184 points. On the pre-test, individuals' correct responses ranged from one to 11, while post-test scores ranged from seven to 17. All students gained points

TABLE I

COMPARISON OF INDIVIDUAL STUDENT COMBINED
SCORES ON THE PRE-TEST AND POST-TEST

Student	IQ	*Combined Pre-Test Score	**Combined Post-Test Score	Increase or Decrease Score
1	84	24	56	+ 32
2	96	41	62	+ 21
3	111	40	76	+ 36
4	90	22	57	+ 35
5	100	48	65	+ 17
6	98	43	63	+ 20
7	109	49	65	+ 16
8	108	44	68	+ 24
9	110	42	72	+ 30
10	100	34	67	+ 33
11	103	41	63	+ 22
12	128	60	77	+ 17
13	80	54	66	+ 12
14	90	27	69	+ 42
15	109	41	64	+ 23
16	130	56	82	+ 26
17	104	38	67	+ 29
18	92	28	64	+ 36
19	103	51	72	+ 21
20	104	34	61	+ 27
21	80	58	82	+ 24
22	69	31	49	+ 18
23	108	51	74	+ 23
24	90	54	70	+ 16
25	90	25	68	+ 43
26	90	27	49	+ 22
27	102	33	62	+ 27
28	106	28	54	+ 26
29	88	44	49	+ 5
30	96	37	56	+ 19
Mean	95.6	40.16	64.90	24.40

* Total number of items answered correctly on the pre-test of combined units

** Total number of items answered correctly on the Post-test of combined units

Total possible responses for combined units - 89

TABLE II

SUMMARY OF PRE-TEST SCORES, POST-TEST SCORES AND
POINTS GAINED - PART I - KINDS OF CARBOHYDRATES

Students	IQ	Pre-Test *Number of Points	Post-Test **Number of Points	Increase or Decrease Score
1	84	8	30	+ 22
2	96	21	32	+ 11
3	111	16	40	+ 24
4	90	9	29	+ 20
5	100	23	32	+ 9
6	98	22	27	+ 5
7	109	22	28	+ 6
8	108	18	28	+ 10
9	110	19	38	+ 19
10	100	10	31	+ 21
11	103	16	29	+ 13
12	128	32	37	+ 5
13	80	25	34	+ 9
14	90	10	35	+ 25
15	109	16	26	+ 10
16	130	31	41	+ 10
17	104	7	27	+ 20
18	92	9	34	+ 25
19	103	27	40	+ 13
20	104	11	26	+ 15
21	80	25	41	+ 16
22	69	17	28	+ 11
23	108	27	36	+ 9
24	90	29	36	+ 7
25	90	6	36	+ 30
26	90	12	24	+ 12
27	102	14	29	+ 15
28	106	10	21	+ 11
29	88	24	27	+ 3
30	96	17	25	+ 8
Mean	95.6	17.76	31.56	14.70

* Total number of items answered correctly on the Pre-test

** Total number of items answered correctly on the Post-test
Possible responses 47

on the post-test. The number of students and the number of points gained by individual students is presented in Table III. The mean score for the pre-test was 7.13, the post-test mean score was 13.26. The gain in mean scores was 6.13.

Part III, Other Nutrients Found in Carbohydrate Foods, the final part of the individualized instruction units contained seven items on the pre-test and post-test. There were 25 possible correct responses on this test. Total correct responses for all students on the pre-test was 458 and 602 for the post-test. The number of points increased on the post-test was 144. Individuals' pre-test scores, representing correct responses, ranged from 10 to 23. Post-test scores ranged from 12 to 25. There were 28 students who gained points on the post-test. One student maintained the same score and one student's post-test score decreased five points from the pre-test score. The number of students is presented in Table IV. The mean score for the pre-test was 15.26 and the post-test mean score was 20.06. The gain in mean scores was 4.80.

Analysis of Student Ability Groupings

And Student Scores

Intelligence quotients for each student was obtained from student files in the high school administration office. The most recent intelligence test administered to these students was during the ninth grade. The Otis Quick Scoring Mental Ability Intelligence Test was the instrument used to determine their ability group.

Comparative Test Scores (1964) defined ability levels for this mental ability intelligence test. Scores of 89 or below was below

TABLE III

SUMMARY OF PRE-TEST SCORES, POST-TEST SCORES AND
POINTS GAINED - PART II CARBOHYDRATES AND
THEIR CONTRIBUTION TO THE DIET

Students	IQ	Pre-Test *Number of Points	Post-Test **Number of Points	Increase or Decrease Score
1	84	4	7	+ 3
2	96	6	12	+ 6
3	111	10	15	+ 5
4	90	1	12	+ 11
5	100	8	13	+ 5
6	98	6	15	+ 9
7	109	9	12	+ 3
8	108	6	17	+ 11
9	110	6	13	+ 7
10	100	8	15	+ 7
11	103	7	13	+ 6
12	128	10	17	+ 7
13	80	10	13	+ 3
14	90	6	14	+ 8
15	109	9	15	+ 6
16	130	11	17	+ 6
17	104	11	15	+ 4
18	92	8	14	+ 6
19	103	7	9	+ 2
20	104	8	15	+ 7
21	80	10	17	+ 7
22	69	3	8	+ 5
23	108	11	16	+ 5
24	90	8	14	+ 6
25	90	6	13	+ 7
26	90	5	10	+ 5
27	102	6	11	+ 5
28	106	6	13	+ 7
29	88	3	10	+ 7
30	96	5	13	+ 8
Mean	95.6	7.13	13.26	6.13

* Total number of items answered correctly on the pre-test

** Total number of items answered correctly on the post-test
Possible responses 17

TABLE IV

SUMMARY OF PRE-TEST SCORES, POST-TEST SCORES AND
POINTS GAINED - PART III OTHER NUTRIENTS
FOUND IN CARBOHYDRATE FOODS

Student	IQ	Pre-Test *Number of Points	Post-Test **Number of Points	Increase or Decrease Score
1	84	12	19	+ 7
2	96	14	18	+ 4
3	111	14	21	+ 7
4	90	12	16	+ 4
5	100	17	20	+ 3
6	98	15	21	+ 6
7	109	18	25	+ 7
8	108	20	23	+ 3
9	110	17	21	+ 4
10	100	16	21	+ 5
11	103	18	21	+ 3
12	128	18	23	+ 5
13	80	19	19	+ 0
14	90	11	20	+ 9
15	109	16	23	+ 7
16	130	14	24	+ 10
17	104	20	25	+ 5
18	92	11	16	+ 5
19	103	17	23	+ 6
20	104	15	20	+ 5
21	80	23	24	+ 1
22	69	11	13	+ 2
23	108	13	22	+ 9
24	90	17	20	+ 3
25	90	13	19	+ 6
26	90	10	15	+ 5
27	102	13	22	+ 9
28	106	12	20	+ 8
29	88	17	12	- 5
30	96	15	18	+ 3
Mean	95.6	15.26	20.06	4.86

* Total number of items answered correctly on the pre-test

** Total number of items answered correctly on the post-test
Possible responses 25

average ability; a score between 90 and 110 was average ability, and scores 111 or greater was above average ability. Ability levels for the 30 students in this study ranged from 69 to 130. Five, or 16.66 per cent, were in the below average ability group with an intelligence quotient of 89 or below; 22 students or 73.33 per cent were in the average ability group with an intelligence quotient between 90 and 110; and three students or 10 per cent were in the above average ability group with an intelligence quotient of 111 or above.

In contrast to the findings of Harper (1973), who reported that students in below average and above average ability groups made the most significant gains in scores, this investigator failed to find any similarity between individual's ability level and the number of points gained on each individualized instruction unit. The largest gain in combined scores was among the average ability group. In fact, the two students with the largest gain in scores, 43 points and 42 points, were both within the average ability group with an intelligence quotient of 90. The two students with the smallest gain in scores, 5 points and 12 points, were both within the below average ability group with an intelligence quotient of 80 and 88. The 10 largest gain in scores were attained by one out of five students in the low ability group, by seven out of 22 students in the average ability group, and by two out of three in the above average ability group. The 10 lowest gain in scores were attained by three out of five students in the low ability group, by six out of 22 students in the average ability group, and by one out of three students in the above average ability group.

Student Opinion Survey Of Individualized Instruction

The thirty students who participated in this study were asked to express their opinion of this method of instruction after they had completed the post-test of the final individualized instruction unit. The opinion survey contained seven discussion items which were to be answered anonymously. A copy of the opinion survey may be found in Appendix H, page 114.

Each of the thirty students answered all of the items on the survey. Information obtained from the survey was concerned with students' likes and dislikes of individualized instruction as a method of instruction. One half or 50 per cent of the students indicated they liked the slides or pictures "best" about this method of instruction. Studying by themselves was liked most by eight or 26 per cent of the students. Three students liked this method of instruction because it was "quick". Two students thought it was interesting and one student failed to find any thing positive about individualized instruction. The second item on the opinion survey was, "what do you dislike most about this method of instruction?" The majority, 60 per cent, disliked not being able to have class discussion or asking questions. Seven students, 23 per cent, disliked the test most in this method of instruction. Three students indicated this method of instruction was too fast, and two said they "did not dislike any thing about this method of instruction."

In ascertaining how many students had been exposed to individualized instruction, this author found twenty-eight, or 93

per cent, of the students had never used this method of instruction. Two students had used it in Basic Business and Biology.

The fourth item on the survey was, "were you familiar with all of the words in the script?" All but six students, 80 per cent, were not familiar with many of the words in the script and 20 per cent were familiar with all of the words in the script. Six students indicated they were familiar with most of the words from previous food classes.

When asked "what improvement would you make on the entire presentation," six suggestions were to improve the script by shortening the paragraphs. Twenty four, 80 per cent, indicated the script did not need improvement. On item six and seven, all students concurred the slides did not need improvement and that the directions were very clear.

Because of the increase in students' post-test scores the writer is led to believe that students can learn from this method of individualizing instruction. However, the writer failed to find any relationship between students' post-test scores and student's mental ability.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This particular study was concerned with the development of individualized instruction units and the effectiveness of these units for teaching selected aspects of food and nutrition to junior and senior high school students. The objectives were:

- (1) to review basic nutrition materials and to identify concepts of carbohydrates in food and nutrition,
- (2) to develop an individualized instruction unit, utilizing 35 mm slides and cassette tape for teaching food and nutrition to juniors and seniors in high school,
- (3) to determine the effectiveness of the individualized instruction units through pre-test and post-test design using the criteria of intelligence quotient,
- (4) to obtain students' opinion of individualized instruction as a method of instruction, and
- (5) to make recommendations for this method of instruction.

The development of the individualized instruction units involved identifying concepts in carbohydrates and in audio-visual instruction. After behavioral objectives were identified from these concepts, three individualized instruction units were written. Each unit included a pre-test and post-test written according to a table of specifications,

an introduction to each unit, a written script, directions for operation of audio-visual and recording equipment, photographing slides, and recording cassette tapes.

The individualized instruction units were presented to a group of students in study hall, and on the basis of their evaluations, revisions were made on the pre-test procedure and recorded narration. The individualized instruction units were then presented to thirty junior and senior students who were enrolled in two Vocational Home Economics IV classes at Charles Page High School in Sand Springs, Oklahoma.

Analysis of the findings of this study included range and gain in scores from pre-test and post-test items on each of the three individualized instruction units individually and combined. Comparisons were made of students' intelligence quotient with gain in post-test scores. The results of the opinion survey were summarized.

Summary of Findings and Conclusions

The findings of this study appeared to indicate that individualized instruction can be an effective method for teaching select areas of food and nutrition to junior and senior high school students. This was evidenced by all students making point gains on combined post-test scores.

There appeared to be a lack of similarity between students' ability levels, and the number of points gained on individualized instruction units. The ten students with the largest gain in scores, and the ten students with the smallest gain in scores were representative of all three ability groups.

The majority of students had a favorable opinion toward individualized instruction as a method of teaching food and nutrition. This favorable reaction could be contributed partly to the uniqueness of the program to this select group of students.

This method of instruction does save time for both the student and the instructor. After the initial development of the individualized instruction units the material can be used repeatedly without further preparation by the instructor. Students are able to administer the units themselves without assistance from an instructor.

Recommendations

On the basis of the findings in this study the writer makes the following recommendations:

1. The individualized instruction units in this study could be used as an alternative method to traditional methods of instruction.
2. The application of statistical tools in the determination of the effectiveness of individualized instruction may determine if a significantly high level of learning occurs as a result of this method of instruction.
3. Additional research is needed to determine the extent to which learning is retained with this method of instruction.
4. Home economics teachers desiring to develop individualized instruction units in any area need to be trained in all facets of the development of these units.

5. Specifically, home economics teachers desiring to utilize audio-visuals in an individualized instruction unit should be trained in audio-visual production and should have some training in audio-visual transmission theory.
6. Individualized instruction units developed on the basis of a student interest survey would appear to be appropriate.
7. The results of this investigation indicated to the author additional developmental studies on other nutrients would be appropriate.
8. Development of additional topics related to the subject area in this research such as, Requirements for Stages of Life, Principles of Selection and Storage, and Principles of Carbohydrate Cookery is recommended.
9. Individualized instruction units developed for use in beginning food and nutrition classes on the Home Economics I and II levels would be desirable.

SELECTED BIBLIOGRAPHY

- "A Concept of Individualized Instruction," Educational Product Report, Vol. 6 (October, 1972), pp. 7-16.
- Ahmann, Stanley and Marvin D. Glock. Evaluating Pupil Growth, Principles of Test and Measurement. 3rd ed. Boston: Allyn and Bacon, Inc., 1961.
- Allen, William H. "Audio-Visual Materials." Review of Educational Research, Vol. 26 (April, 1956), pp. 125-156.
- Currueth, Betty R., and Sherrell B. Foree. "Cartoon Approach To Nutrition Education." Journal of Nutrition Education, Vol. 3 (Fall, 1971), pp. 59-62.
- Dale, Edgar. Audio-Visual Methods In Teaching. Revised Edition. New York: The Dryden Press, 1954.
- Dwyer, Johanna R., Jacob J. Feldman, and Jean Mayer. "Nutrition Literacy of High School Students." Journal of Nutrition Education, Vol. 2 (Fall, 1970), pp. 59-66.
- Dwyer, Johanna T., and Jean Mayer. "Potential Dieters: Who Are They?" Journal of the American Dietetic Association, Vol. 56 (June, 1970), pp. 56-60.
- Dowell, Linus J. "A Study of Selected Health Education Implications." The Research Quarterly, Vol. 37 (March, 1966), pp. 330-335.
- Eash, Maurice J. "Assessing Curriculum Materials: A Preliminary Instrument." Educational Product Report, Vol. 6 (February, 1969), pp. 18-24.
- Eisile, James E. "Individualized Instruction." Educational Leadership, Vol. 48 (October, 1971), pp. 16-20.
- Eppright, Ercel S., Mattie Pattison, and Helen F. Barbour. Teaching Nutrition. 2nd Ed. Ames, Iowa: Iowa State College, 1963.
- French, John E. "Children's Preferences for Pictures of Varied Complexity of Pictorial Patterns." Elementary School Journal, Vol. 53 (1952), pp. 90-95.

- Fuller, Gloria June. "The Development of a Learning Tape To Teach Blind Students A Basic Food Preparation Skill." (unpub. Master's Thesis, Oklahoma State University, 1972).
- Good, Carter V. Introduction to Educational Research. 2nd Ed. New York: Appleton-Century-Crofts, 1963.
- Grittner, Frank M., and Fred H. LaLeike. Individualized Foreign Language Instruction. Skokie, Illinois: National Text Book Company, 1973.
- Gussow, Joan. "Nutrition Education--Is There Any Other Choice?" Speech Given at American Home Economics Association 64th Annual Meeting, Atlantic City, New Jersey, June 27, 1973.
- Hampton, Mary C., Ruth L. Huenemann, Leona R. Shapiro, and Barbara W. Mitchell. "Caloric and Nutrient Intakes of Teen-Agers." Journal of the American Dietetic Association, Vol. 50 (May, 1967), pp. 385-396.
- Harden, Margarette, and Mina W. Lamb. "Bioassy - Tool for Conceptual Learning." Journal of Nutrition Education, Vol. 1 (Spring, 1970), pp. 13-15.
- Harper, Jane. "The Development and Evaluation of a Multi-Media Self-Instructional Package in Beginning French at Tarrant County Junior College." (Unpub. Doctoral Dissertation, East Texas State University, 1971).
- Harrison, Price E., and Leslie W. Irwin. "Certain Harmful Health Misconceptions of Junior High School Students Attending Public Schools in Metropolitan Areas." The Research Quarterly, Vol. 35 (December, 1964), pp. 391-396.
- Huenemann, Ruth L. "A Review of Teenage Nutrition in the United States." Proceedings National Nutrition Education Conference. Mics. Pub. No. 1254, United States Department of Agriculture, 1971.
- Kline, Joyce, Jewel Barron, and Margaret M. Roberts. "Comprehensive Self-Improvement Program for Inner City Obese Teenage Girls." Journal of School Health, Vol. 29 (January, 1969), pp. 21-28.
- Lantagne, J. E. "Health Interest in 10,000 Secondary School Students." The Research Quarterly, Vol. 37 (March, 1952), pp. 387-390.
- Mayer, Robert F. Preparing Instructional Objectives. California: Fearon Publishers, 1962.
- Mayer, Jean. "The White House Conference." Journal of Home Economics, Vol. 61 (September, 1969), p. 500.
- Miller, William A. "The Picture Choices of Primary-Grade Children." Elementary School Journal, Vol. 37 (1936), pp. 273-282.

- Murphey, Vera R. "Development and Evaluation of Programmed Modules For The College Level." (unpub. Ed. D. Dissertation, Oklahoma State University, 1969).
- Nelson, Helen. Development Of Programmed Instruction For Home Economics Education And Study Of Attitudes Toward Its Use At The Under Graduate Level. Research Report No. 5. New York: Cornell University, 1966, pp. 1-27.
- Neu, D. Morgan. "The Effect of Attention Gaining Devices on Film-Mediated Learning." Journal of Educational Psychology, Vol. 42 (1951), pp. 479-490.
- Norman, Edward C. and John R. K. Robson. "Methods of Teaching." The Journal of the American Dietetic Association, Vol. 58 (April, 1971), p. 311.
- "Nutrition Survey Highlights." Food and Nutrition, Vol. 3 (February, 1973), pp. 6-7.
- Ogilvie, Carole Anne. "The Development of Educational Media for Teaching High School Boys' Foods and Nutrition Classes." (unpub. Master's Thesis, Oklahoma State University, 1969).
- Rogers, Pollyanna. "Contributions of the Vocational Homemaking and School Lunch Programs to Nutrition Education in an Oklahoma School." (unpub. Master's Thesis, Oklahoma State University)
- Rudisill, M. "Children's Preference for Color vs. Other Qualities in Illustrations." Journal of Home Economics, Vol. 52 (1951), pp. 444-451.
- Scanlon, Robert G. "Individually Prescribed Instruction." Educational Technology, (December, 1970), pp. 44-46.
- Schwartz, Nancy E., Julia I. Dalrymple, and Virginia M. Vivian. "High School Nutrition Education: How Effective Is It?" Journal of Home Economics, Vol. 66 (May, 1974), pp. 16-18.
- Short, Sarah. "Nutrition and Food Science: A Self-Instruction Lab." Nutrition News, Vol. 33 (February, 1970), p. 2.
- Sipple, Horace L. "Problems and Progress in Nutrition Education." Journal of the American Dietetic Association, Vol. 59 (July, 1971), pp. 18-21.
- Smith, K. U., and William M. Smith. Behavior of Men. New York: Holt, Rinehart, and Winston Co., 1958.
- State Department of Education. Oklahoma Food Habits. School Lunch Division, Oklahoma City, Oklahoma, 1969.

- Tani, Guen S., and Jean H. Hankin. "A Self-Learning Unit For Patients with Diabetes." Journal of the American Dietetic Association, Vol. 58 (April, 1971), pp. 331-335.
- Travers, Robert M., and Others. "Research and Theory Related To Audiovisual Information Transmission." Washington, D. C.: U. S. Department of Health, Education and Welfare, 1967, pp. 29-42.
- United States Department of Agriculture. Proceedings of Nutrition Education Conference. Misc. Publication No. 1075. Washington, D. C.: W. W. Government Printing Office, 1967.
- U. S. Department of Agriculture. Yearbook of Agriculture, 1959. Washington, D. C.: Government Printing Office, 1959.
- VandeMeer, Abram W. "Color vs. Black and White In Instructional Films." Audiovisual Communication Review, Vol. 2 (1954), pp. 121-134.
- Wayda, Sullen. "The Development of Self-Instructional Modules For Hospitality Education." Speech given at American Home Economics Association 64th Annual Meeting, Atlantic City, New Jersey, June 27, 1973.
- Weiss, Raymond A., and M. Gladys Scott. "Construction of Tests." Research Methods In Health, Physical Education, and Recreation. Editor, M. Gladys Scott. Washington, D. C.: American Association for Health, Physical Education, and Recreation, 1959.
- Wheat Flour Institute. "Everything You Always Knew About Eating Habits." Institute Ideas (February, 1972), pp. 1-2.
- Wittich, Walter, and Charles F. Schuller. Audiovisual Materials. New York: Harper and Row, 1967.

APPENDIX A

OUTLINES FOR PART I - KINDS OF CARBOHYDRATES,
PART II - CARBOHYDRATES AND THEIR
CONTRIBUTION TO THE DIET, AND
PART III - OTHER NUTRIENTS
FOUND IN CARBOHYDRATE FOODS

OUTLINE FOR PART I-KINDS OF CARBOHYDRATES

I. KINDS OF CARBOHYDRATES

A. Monosaccharides

1. Simple sugar
2. Formed in the vegetable kingdom
3. Chief food sources are fruits, honey and corn syrup
4. Glucose is obtained commercially by chemical treatment of starch. Does not appear in the food market as pure glucose but as commercial glucose or corn syrup
5. Honey is the only common food containing a high percentage

B. Disaccharides

1. Double sugar
2. Chief food sources are cane and beet sugars, molasses, maple syrup and malt products
3. Lactose is the only major carbohydrate of animal origin

C. Polysaccharides

1. Starch
 - a. chief food sources are grains and vegetables. (especially tubers and legumes)
 - b. only polysaccharide which can be used effeciently
2. Cellulose
 - a. chief food sources are stalks and leaves of vegetables, outer coverings of seeds and fruit
 - b. is not digested by the enzymes of the body

OUTLINE FOR PART II-CARBOHYDRATES AND
THEIR CONTRIBUTION TO THE DIET

II. CONTRIBUTION TO THE DIET

A. Energy

1. Carbohydrates make up the bulk of man's energy supply.
2. Monosaccharides can be rapidly absorbed.
3. Glucose that is eaten as such is absorbed from the intestine and passed into the blood for use as energy.
4. Before the body can use complex carbohydrates (fructose, galactose, sucrose, lactose, maltose and starch) for energy they must be split into glucose.
5. Complex carbohydrates are carried by the blood to the liver where they are converted to glycogen.
6. Excessive amounts of glucose is converted into glycogen and stored in the liver and muscles. When energy is needed urgently the liver releases glucose into the blood from its store of glycogen.

B. Relation to Protein

1. If carbohydrates are supplied to the diet the body uses them in preference to protein.
2. Carbohydrates reduce the waste of body protein. This process is referred to as protein-sparing.

C. Relation to Fat

1. The body has a limited capacity for storing glycogen. Therefore when carbohydrates are supplied in excess they are converted into fat and stored in the tissues.
2. The reverse affect is possible when carbohydrate is not available for energy, the body begins to draw on its other components and breaks down tissue fat and protein.
3. Carbohydrates are required for the complete oxidation of fat.

D. Relation to Digestion and Elimination

1. Carbohydrates that are less soluble and less rapidly digested (lactose and starch) remain in the intestine longer and favor the growth of other bacteria which aids in absorption.
2. Cellulose is not digested by the enzymes of the body but accumulates in the intestine and expands it. Since cellulose absorbs water it contributes to the bulk of the feces and helps to prevent constipation.

E. Flavor

1. The sweetening power of sugar is an advantage in making some foods more palatable.
2. Because of the pleasing flavor of sugar it may be allowed to replace other foods and the diet will be deficient in the building and regulating materials which sugar lacks.
3. Some foods are sweetened by their own sugar, for example, young peas, corn and other vegetables as compared to more mature ones that contain little sugar.

OUTLINE FOR PART III-OTHER NUTRIENTS
FOUND IN CARBOHYDRATE FOODS

III. CONTRIBUTION TO HEALTH

A. Other nutrients found in carbohydrate foods

1. Cereal Grains

- a. Are valuable chiefly for their carbohydrate content, approximately 75%
- b. Cereals contain some protein approximately 7 to 14% of the incomplete type
- c. Vitamins and minerals in cereal grains are found mostly in the outer layers. Since much of this is lost in the milling process, enrichment of flour is practiced to restore thiamine, riboflavin, niacin and iron.
- d. Minerals most commonly found in cereal grains are calcium and phosphorus

2. Fruits and Vegetables

- a. All fruits and vegetables contain carbohydrates, but the form and amount may vary greatly depending on the type and the degree of maturing and ripening of the plant.
- b. Roots and tubers contain about 20% carbohydrates and a small amount of vitamin C which is best preserved when potatoes are cooked in their skins.
- c. White potatoes supply some potassium and a small amount of thiamine and iron.
- d. Sweet potatoes and carrots are of value primarily because of the large quantity of carotene (provitamin A) they contain
- e. Vegetable leaves are rich sources of provitamin A and they are good sources of iron, calcium, riboflavin and folic acid. They provide roughage in the diet.

- f. Fresh fruits and vegetables are very good sources of ascorbic acid.

3. Legumes

- a. Dry legumes seeds (beans, peas, and lentils) contain approximately twice as much protein as cereals and about the same amount of carbohydrate
- b. Legumes like cereals contain proteins which are incomplete and should be supplemented with higher quality proteins (such as found in cheese or meat)
- c. Most legumes are good sources of thiamine and contain some riboflavin and niacin, also lesser amounts of phosphorus, iron, and calcium
- d. Peanuts are like legumes in composition, except for their high fat content.

4. Milk and Milk Products

- a. Milk, which is usually recognized as an important source of protein contains the only animal source of carbohydrate.

APPENDIX B

INDIVIDUALIZED INSTRUCTION UNIT PART I

KINDS OF CARBOHYDRATES

STUDENT INFORMATION

PART I

Kinds of Carbohydrates

INTRODUCTION

The study of nutrition should be one of the most interesting and usable subjects you will study. It is a very personal subject because it is all about you, you as an individual, you as an individual who wants to be attractive and who wants to be in good physical condition. Being an individual who is free to make choices about what kinds of food we eat and liking the taste of some foods better than others, we sometimes lose sight of one of the basic reasons why we eat food, that being, to keep our body in good physical condition.

Since your physical health plays an important part in how you feel and how you look, knowing what kinds of food the body needs and how the body uses these foods seems important for every individual to know. However, since you are an individual having talents and abilities different from any other individual you may learn differently than other people. This unit of study will help you learn more about your body and how it works. It is called Individualized Instruction, and it has been designed for individual people just like you. Part I of this individualized instruction unit emphasizes the kinds of carbohydrates and in what foods they can be found.

OBJECTIVES

Upon completion of this unit, you should be able to:

1. Discuss in writing the primary function of carbohydrates in the body.
2. Name the three (3) sub-divisions of carbohydrates and identify characteristics of each.
3. Select foods containing lactose.
4. Name glucose as the only form of carbohydrate which can be utilized in the blood for energy.
5. List food containing large amounts of cellulose.
6. Discuss the major function of cellulose in the body.
7. Identify foods which contain sugar and starch.
8. Identify, by matching, the function of carbohydrates, fats, protein, minerals and vitamins in the body.
9. Select foods containing monosaccharides.
10. Select foods containing disaccharides.
11. Select foods containing polysaccharides.

NARRATION FOR THE SLIDES. PART I - "KINDS OF CARBOHYDRATES"

Frame Script

1. Part I
Kinds of Carbohydrates

2. Happy Birthday to You _____ Whether it's a birthday,

3. A wedding reception, or

4. A family picnic, food is a vary important part of many of
the special occasions in our lives.

5. Food may have different meanings for different people. For
the new born baby, food may be a form of security and love.

6. Food may be given as gifts or used in celebrating a holiday.

7. Food may have religious significance.

8. It is often given as an expression of affection and love.

9. Why do we eat some food in particular? Obviously one reason
we eat is because we get hungry. Another important reason
why we eat is to provide our bodies with the essential nutrients
which are necessary for optimun health. These essential
nutrients, (which means they are necessary for life) perform
different functions in the body.

10. For example, protein is needed for growth and repair of body
tissues.

11. Vitamins and minerals protect against diseases. And _____

12. Fats and carbohydrates provide energy.

13. How can these nutrients, that are found in foods which we eat,

- build and repair body tissues
- protect against diseases
- provide energy?

Let us analyze the nutrient carbohydrate and see in what foods they can be found and how they are used in the body.

14. Carbohydrates are the major source of energy for most people in the world.

15. The primary function of carbohydrates is to serve as the principle source of energy for the body. This energy is in the form of calories or heat which is converted to energy of activity.

16. There is an abundant supply of food which contains carbohydrates. All carbohydrates, except those found in milk are found in fruits, vegetables, cereal grains and legumes.

17. We commonly classify carbohydrate foods into two groups, sugar and starch. However _____

18. Chemically they are sub-divided into three groups called monosaccharides, disaccharides and polysaccharides. The

main difference in the three kinds of carbohydrates is the number of molecules of which each is made.

19. Monosaccharides are the simplest form of carbohydrates because they are made of only one unit of sugar. For this reason they are called simple sugars.

20. The monosaccharide glucose is the only form of carbohydrate the body is able to utilize. All other forms of carbohydrate eaten are changed to glucose in the liver before they can circulate in the blood and be used by the tissues for energy.

21. The principle sources of glucose are fruits and vegetables: for example, sweet fruits such as grapes, berries, and oranges, and vegetables such as sweet corn and carrots.

22. Corn syrup, another source of the monosaccharide glucose, is obtained commercially by a chemical treatment of starch.

23. Other monosaccharides are found in many ripe fruits and vegetables. Honey also contains a high percentage of monosaccharides.

24. Disaccharides are the second group of carbohydrates. It differs from the monosaccharides in that it is made up of two units of sugar. It is often called a double sugar.

25. The disaccharide which we are most familiar is table sugar or cane sugar; other sources are beet sugar, and molasses.

26. Another disaccharide which does not occur in many foods can be produced by the fermentation of grains, and they are present in beer and malted breakfast cereals.

27. The only carbohydrate found in significant amounts in animal sources is a disaccharide called Lactose. This is a sugar found in milk and is produced only by mammals.

28. The Polysaccharides are the third group of carbohydrates. These polysaccharides appear to be very complex. Actually they are many units of sugar connected like a chain.

29. The two polysaccharides which we are familiar with are starch and cellulose. Corn and potatoes contain large amounts of starch and celery contains cellulose.

30. The chief food sources of starch are grains, and all products made from grains; some examples are breads, cereals, macaroni and cakes.

31. Beans, peas, and certain tuber and root vegetables, such as potatoes and sweet potatoes, are also rich sources of starch.

32. Cellulose is the carbohydrate that forms the framework of plants. The chief sources of cellulose are stalks and leaves of vegetables, and outer coverings of seeds and fruits.

33. The human body is unable to digest cellulose because it does not have the enzyme necessary for digestion. However cellulose does have a major function in the body. It provides the

necessary bulk for elimination.

THE END

When you have finished viewing the slides and turned tape player and projector off, ask your instructor for the post-test. After you have completed the test, return it to the instructor.

APPENDIX C

INDIVIDUALIZED INSTRUCTION UNIT PART II -
CARBOHYDRATES AND THEIR CONTRIBUTION
TO THE DIET

STUDENT INFORMATION

PART II

Carbohydrates and Their Contribution to the Diet

INTRODUCTION

Carbohydrates are probably one of the most popular foods we have in our diet. After all who can resist a piece of fresh apple pie with ice cream or hot yeast rolls and butter.

Have you ever thought about what happens to the food you eat and how the body uses it to carry on the functions of the body? Part II of this Individualized Instruction unit emphasizes how the body utilizes carbohydrate foods.

OBJECTIVES

Upon completion of this unit, you should be able to:

1. Name six contributions of carbohydrates to the diet.
2. Define glucose.
3. Identify how carbohydrates are utilized by the body.
4. Select the meaning of glycogen.
5. Identify the parts of the body where glycogen is stored.
6. Tell what happens when excessive amounts of carbohydrates are consumed.
7. Tell what happens when carbohydrates are not available for the body to use for energy.

NARRATION FOR THE SLIDES. Part II - "Carbohydrates and Their
Contribution to the Diet"

Frame Script

1. Carbohydrates and their contribution to the diet.

2. Carbohydrates play an important role in the diet by:
 1. providing immediate energy
 2. providing stores of glycogen that can be used for energy
 3. sparing protein
 4. aiding gastrointestinal functions
 5. contributing to the bulk in the diet
 6. flavoring other foods

3. Glucose, a monosaccharide, is the end product of all carbohydrates that are eaten. It is also the only form of carbohydrate which can be utilized by the cells for energy.

4. Glucose that is eaten as such is absorbed from the intestine and passed directly into the blood to meet immediate tissue energy needs. Before the body can use complex carbohydrates, such as disaccharides and polysaccharides, for energy they must be split into glucose.

5. If the body has met its requirement for immediate energy needs some carbohydrates will be stored as glycogen in the liver and muscles. Glycogen is the storage form of carbohydrate in the body. When energy is needed urgently the muscles and liver release glucose into the blood from its store of glycogen.

6. If all the glycogen from muscles and liver was completely used it would furnish only about one half of the day's energy needs.

7. The nutrient needs for physical growth and energy vary at different ages. For example, energy requirements for teen-agers is often greater than for adults due to continued growth needs and physical activity.

8. The Food and Nutrition Board of the National Research Council has made recommendations for daily dietary allowances for all essential nutrients except carbohydrates. There is no definite nutritional requirement for carbohydrates. The pleasing flavor of most carbohydrate foods has influenced the high acceptance of carbohydrate foods by most all groups of people.

9. Although there is no recommended allowance for carbohydrates, recommendations have been made for caloric intake in different age groups. The caloric recommendation is considered because carbohydrates are used mainly for energy and energy value is measured in calories.

10. Because of the body's limited capacity for storing glycogen in the liver and muscles other carbohydrates supplied in excess are converted into fat and stored in the tissues. The reverse affect is possible when carbohydrates are not available for energy. The body begins to draw on its other components and breaks down tissue fat and protein for energy.

11. When carbohydrate foods are eaten in the quantity needed by the body for energy, maintenance, and growth, body weight will remain stable.

12. When carbohydrate foods are eaten in excess of the amount needed by the body for energy, maintenance, and growth, the surplus will be stored as fat and result in gain of body weight. Furthermore, the reverse effect will result and body weight will be lost when less calories are consumed than is needed by the body for energy, maintenance and growth. When there is an excessive accumulation of body fat, overweight or obesity results. Overweight and obesity are symptoms of overeating.

13. If carbohydrates are supplied in the diet in adequate amounts the body will use them for energy and spare the protein.

14. Carbohydrates therefore reduce the waste of body protein allowing protein to be used for the purpose of building and repairing body tissue. This process is referred to as protein sparing.

15. Carbohydrates that are less rapidly digested remain in the intestine longer and promote the growth of desirable bacteria that are useful in the synthesis of some B vitamins.

16. Cellulose, a polysaccharide, is one carbohydrate that is not digested by the enzymes of the body. Its contribution to the diet is by accumulating in the intestine and expanding it.

Since cellulose absorbs water it contributes to the bulk of the feces and helps to prevent constipation.

17. Because of the sweetening power of sugar, it is an advantage in making some foods more palatable. Some foods are sweetened by their own sugar. For example, young peas, corn, and other vegetables as compared to more mature ones that contain little sugar.

18. Because of the pleasing flavor of sugar it may be allowed to replace other foods and the diet will be deficient in the building and regulating materials which sugar lacks.

THE END

When you have finished viewing the slides and turned tape player and projector off, ask your instructor for the post-test. After you have completed the test, return it to the instructor.

APPENDIX D

INDIVIDUALIZED INSTRUCTION UNIT PART III -
OTHER NUTRIENTS FOUND IN
CARBOHYDRATE FOODS

STUDENT INFORMATION

PART III

Other Nutrients Found In Carbohydrate Foods

INTRODUCTION

The primary function of carbohydrates in the diet is to provide a source of energy for body functions and activity. However, there are other nutrients found in carbohydrate foods which contribute to good health. Part III of this individualized instruction unit emphasizes some of the other nutrients found in carbohydrate foods.

OBJECTIVES

Upon completion of this unit, you should be able to:

1. Name four food groups in which carbohydrates are classified.
2. Identify nutrients found in cereal grains.
3. Identify foods made from cereal grains.
4. Select nutrients found in fruits and vegetables.
5. Identify nutrients found in legumes.
6. Identify milk and milk products as the only animal source of carbohydrate.
7. Identify the primary function of carbohydrates.
8. Discuss the importance of enrichment of flour.

NARRATION FOR THE SLIDES. Part III - "Other Nutrients Found In
Carbohydrate Foods"

Frame Script

1. Part III

Other Nutrients Found In Carbohydrate Foods

2. Although carbohydrates function in nutrition primarily as a
source of energy there are other nutrients found in carbohy-
drate foods which contribute to good health.

3. Carbohydrate foods are classified into four groups.

1. cereal grains
 2. fruits and vegetables
 3. legumes
 4. milk
-

4. Cereal grains are one group of carbohydrate foods. They
are valuable chiefly for their carbohydrate content,
approximately 75%.

5. Cereals also contain some protein, approximately 7 to 14%
of the incomplete type.

6. Vitamins and minerals most commonly found in cereal grains
are iron, thiamin and niacin.

7. Vitamins and minerals in cereal grains are found mostly in
the outer layers. Since most of this is lost in the milling
process

8. . . . enrichment of flour and other grain products restore thiamin, riboflavin, niacin, and iron.

9. The second group of carbohydrate foods are fruits and vegetables. All fruits and vegetables contain carbohydrates, but the form and amount may vary greatly depending on the type and the degree of maturing and ripening of the plant.

10. Roots and tubers contain about 20% carbohydrates and a small amount of vitamin C. Vitamin C is best preserved when potatoes are cooked in their skins. White potatoes supply some potassium and a small amount of thiamine and iron. Sweet potatoes and carrots are of value primarily because of the large quantity of carotene they contain.

11. Most vegetable leaves are rich sources of provitamin A and they are good sources of iron, calcium and riboflavin.

12. Some fruits and vegetables are very good sources of ascorbic acid (vitamin C), citrus fruits such as oranges, grapefruit, lemons, and limes, also berries, melons and pineapple. Vegetables which are good sources are broccoli, green pepper, cabbage and tomatoes. If a large amount of potatoes are used in the diet, they can become an important source of ascorbic acid.

13. The third group of carbohydrate foods are dry legume seeds such as beans and peas. They contain approximately twice the protein as cereals and about the same amount of carbohydrate.

14. The last group of carbohydrate foods is milk. Milk which is usually recognized as an important source of protein contains the only animal source of carbohydrate. Milk also contains most of the essential nutrients.
-

THE END

When you have finished viewing the slides and turned tape player and projector off, ask your instructor for the post-test. After you have completed the test, return it to the instructor.

APPENDIX E

STUDENT PRE-TEST AND POST-TEST

Student,

You are now ready to begin your individualized instruction by taking a pre-test. This is not a test of the kind you have taken before, it is only a means of obtaining some information about what you already know or think about a particular topic. The pre-test has nothing to do with your grade so feel free to express yourself honestly.

PLEASE TURN TO NEXT PAGE AND COMPLETE PRE-TEST.

PART I

KINDS OF CARBOHYDRATES

Test

1. Check the statements below which are TRUE concerning monosaccharides.

- ☐ A. Monosaccharides are all simple sugars.
- ☐ B. Glucose is a monosaccharide that can be used by the body for immediate energy.
- ☐ C. Monosaccharides are made of more than one unit of sugar.
- ☐ D. Ripe fruits and vegetables, and honey are good sources of monosaccharides.

2. Check the statements below which are TRUE concerning disaccharides.

- ☐ A. Disaccharides are made of two units of sugar.
- ☐ B. Granulated sugar, molasses, malted breakfast cereals and beer are good sources of disaccharides.
- ☐ C. All disaccharides are double sugars.
- ☐ D. Disaccharides are the only carbohydrates which can be utilized directly by the blood for energy.

3. Check the statements below which are TRUE concerning polysaccharides.

- ☐ A. Polysaccharides are made of many units of sugar.
- ☐ B. Some foods containing polysaccharides are beans, cakes, celery, lettuce and macaroni.
- ☐ C. Cellulose is a polysaccharide that forms the framework of plants.
- ☐ D. The two main classes of polysaccharides are sugar and starch.

4. Match each of the following nutrients by writing the letter identifying the function they perform in the body in the space provided.

- A. Provides energy
- B. Builds and repairs body tissues
- C. Protects against diseases

- _____ 1. Carbohydrates
- _____ 2. Fats
- _____ 3. Vitamins
- _____ 4. Proteins
- _____ 5. Minerals

5. Lactose is the only carbohydrate found in significant amounts in animal sources. Check the food below that is a good source of lactose.

- _____ A. Eggs
- _____ B. Beef
- _____ C. Milk
- _____ D. Fish

6. Check the following foods that are primary sources of sugar.

- _____ A. Oranges
- _____ B. Candy
- _____ C. Eggs
- _____ D. Honey
- _____ E. Potatoes
- _____ F. Bread
- _____ G. Jelly

7. Check the following foods that are primary sources of starch.

- ☐ A. Rice
- ☐ B. Molasses
- ☐ C. Macaroni
- ☐ D. Biscuits
- ☐ E. Butter
- ☐ F. Grapes
- ☐ G. Green beans

8. Check the following foods that are good sources of monosaccharides.

- ☐ A. Grapes
- ☐ B. Berries
- ☐ C. Corn syrup
- ☐ D. Sweet corn
- ☐ E. Cereals
- ☐ F. Honey
- ☐ G. Molasses
- ☐ H. Celery

9. Check the following foods that are good sources of disaccharides.

- ☐ A. Cereals
- ☐ B. Beet sugar
- ☐ C. Beer
- ☐ D. Milk
- ☐ E. Apples
- ☐ F. Carrots
- ☐ G. Maple syrup
- ☐ H. Lettuce

10. Check the following foods that are good sources of polysaccharides.

- ☐ A. Corn
- ☐ B. Berries
- ☐ C. Potatoes
- ☐ D. Breads
- ☐ E. Carrots
- ☐ F. Celery
- ☐ G. Honey
- ☐ H. Dried beans and peas

11. List three foods that are good sources of cellulose.

- 1. _____
- 2. _____
- 3. _____

12. Name the three subdivisions of carbohydrates.

_____, _____, and _____.

13. Name the monosaccharide which is the only form of carbohydrate that can be utilized by the body.

_____.

14. Discuss the primary function of carbohydrates in the body.

15. Discuss the primary function of cellulose in the body.

PART II

CARBOHYDRATES AND THEIR CONTRIBUTION TO THE DIET

Test

1. The main function of carbohydrates is to supply energy for the body processes. Carbohydrates have a variety of other functions in the body.

Check five (5) additional functions of carbohydrates.

- _____ A. Protects against diseases
- _____ B. Stores glycogen
- _____ C. Flavors food
- _____ D. Spares protein
- _____ E. Builds and repairs body tissue
- _____ F. Aids digestion
- _____ G. Provides bulk
- _____ H. Prevents scurvy

2. Match the following terms to the correct definition.

- | | |
|---|----------------------|
| _____ 1. The only form of carbohydrate that can be used by cells for energy. | A. sugar |
| _____ 2. A storage place for carbohydrate after the body has met its immediate need for energy. | B. Glycogen |
| _____ 3. The form in which carbohydrate is stored in the liver and muscles. | C. Starch |
| _____ 4. The nutrient that builds and repairs tissue. | D. Muscles and Liver |
| _____ 5. A carbohydrate that contributes bulk to the diet. | E. Protein |
| | F. Cellulose |
| | G. Glucose |

3. From the items below choose the selection which answers the question or completes the sentence. Place the letter to the left of the word or phrase in the numbered blank space.

_____ 1. When the body has reached its capacity for storing glycogen in the liver and muscles other carbohydrates are:

- A. eliminated as waste products.
- B. stored in other parts of the body.
- C. converted into fat and stored in the tissues.

_____ 2. Excessive accumulation of fat in the tissues can result in:

- A. overweight.
- B. lack of energy.
- C. building tissues.

_____ 3. When the body needs carbohydrates for energy and there is no reserve in the muscles or liver it must use tissue fat which can result in:

- A. weight gain.
- B. weight loss.
- C. loss of muscle tissue.

4. Write a short paragraph explaining the following statement, "An important function of carbohydrates is to spare protein for its primary purpose of building and repairing body tissue."

Each of the statements listed below is followed by several answers. Choose the one answer that is CORRECT.

- _____ 5. When an individual's diet primarily consist of carbohydrate foods:
- A. the diet will be deficient in other essential nutrients.
 - B. the diet will provide all the essential nutrients.
 - C. the body will convert excess carbohydrates to other nutrients.
 - D. the diet will provide none of the essential nutrients.
- _____ 6. Cellulose is needed in the diet because:
- A. it provides energy to the body.
 - B. it provides bulk in the diet.
 - C. it promotes the growth of bacteria.
 - D. it protects against diseases.
- _____ 7. Before complex carbohydrates can be utilized by the body they must be converted by the digestive process to:
- A. glycogen
 - B. glycerin
 - C. glucose
 - D. amino acids

WHEN YOU HAVE COMPLETED THE PRE-TEST PLEASE HAND IT IN TO THE INSTRUCTOR.

PART III

OTHER NUTRIENTS FOUND IN CARBOHYDRATE FOODS

Test

1. Check the four (4) food groups below that are classified as carbohydrate foods.
☐ A. Cereal grains
☐ B. Fruits and vegetables
☐ C. Meat
☐ D. Legumes
☐ E. Milk
☐ F. Butter
2. Check the foods listed below that are made from grain products.
☐ A. Biscuits
☐ B. Potato chips
☐ C. Bran flakes
☐ D. Peanut butter
☐ E. Egg custard
3. Check the nutrients listed below that are found in cereal grains.
☐ A. Complete protein
☐ B. Incomplete protein
☐ C. Iron
☐ D. Carbohydrates
☐ E. Thiamine and niacin
☐ F. Fat

4. Check the nutrients listed below that are found in most fruits and vegetables.

_____ A. Various amounts of vitamin C.

_____ B. Fat

_____ C. Carbohydrates

_____ D. Incomplete protein

_____ E. Carotene (vitamin A)

_____ F. Iron

5. Determine whether each of the following statements is True or False. If it is true, circle the "T" in front of the statement. If the statement is false, circle the "F" in front of the statement.

T F 1. All fruits and vegetables contain carbohydrates.

T F 2. Dried beans and peas contain about the same amount of carbohydrates and protein as cereals.

T F 3. The primary function of carbohydrates is to provide a source of energy for the body.

T F 4. Milk is an important source of protein and the only animal source of carbohydrate.

T F 5. Cereal grains are valuable chiefly for their vitamin and mineral content.

6. Why is enrichment of flour important? Discuss.

7. In the numbered space at the left of each item, place the letter which would be the best selection.

- | | |
|---|--|
| _____ 1. To add vitamins and minerals | A. Lemons, oranges, pineapple |
| _____ 2. Fruits which are good sources of vitamin C | B. Enrichment |
| _____ 3. Vegetables which are good sources of vitamin C | C. Protein |
| _____ 4. Sweet potatoes and carrots contain large amounts | D. Milk |
| _____ 5. The only animal source of carbohydrate | E. Bananas, Grapes |
| | F. Broccoli, green pepper, tomatoes, cabbage |
| | G. Vitamin C |
| | H. Green beans, sweet potatoes |
| | I. Carotene |

WHEN YOU HAVE COMPLETED THE PRE-TEST PLEASE HAND IT IN TO THE INSTRUCTOR.

APPENDIX F

COURSE OUTLINE - FOOD AND NUTRITION

OUTLINE - FOOD AND NUTRITION

HOME ECONOMICS IV SPECIAL EMPHASIS

I. Equipment

A. Small Electrical Equipment

1. Identification
2. Choice
3. Use
4. Care
5. Storage

B. Equipping the First Kitchen

1. Basic
2. Additions

II. Safety and Sanitation

A. Poisonings and Protective Agencies

1. Poisoning
 - A. Chemical
 - B. Bacterial
2. Protective Agencies
 - A. Local
 - B. State
 - C. Federal

B. Preservatives

1. Home
2. Commercial

III. Meal Management

A. Increasing skills in

1. Pre-planning
2. Pre-preparation
3. Cost analysis
4. Budgeting

IV. Nutrition

A. Essential nutrients

1. Protein
2. Carbohydrates
3. Fats
4. Vitamins
5. Minerals
6. Water

B. Dietary Distinctions

1. Infant
2. Teen-age
3. Adult
4. Elderly
5. Special considerations
 - A. Weight-loss
 - B. Weight-gain
 - C. Pregnancy
 - D. Diabetic

V. Principles of Food Preparation

A. Increasing skills in basic principles of food preparation.

1. Meat
2. Fruits and Vegetables
3. Starches
4. Sugar
5. Eggs
6. Milk
7. Fat

APPENDIX G

TABLES OF SPECIFICATIONS

KINDS OF CARBOHYDRATES - PART I

ITEM NUMBERS RELATING TO OBJECTIVES	SLIDE NUMBERS RELATING TO OBJECTIVES	SPECIFIC OBJECTIVES
		Upon completion of this unit, the student should be able to:
1, 4	14, 15	1. Discuss in writing the primary function of carbohydrates in the body.
1, 2, 3, 12	18, 19, 24, 27, 28, 29	2. Name the three (3) sub-divisions of carbohydrates and identify characteristics of each.
5	27	3. Select foods containing lactose.
13	20	4. Name glucose as the only form of carbohydrate which can be utilized in the blood for energy.
11	32	5. List food containing large amounts of cellulose.
15	33	6. Discuss the major function of cellulose in the body.
6, 7	30, 31	7. Identify foods which contain sugar and starch.
4	9, 10, 11, 12, 13	8. Identify, by matching, the function of carbohydrates, fats, protein, minerals and vitamins.

ITEM NUMBERS RELATING TO OBJECTIVES	SLIDE NUMBERS RELATING TO OBJECTIVES	SPECIFIC OBJECTIVES
8	21, 22, 23	9. Select foods containing monosaccharides.
9	25, 26, 27	10. Select foods containing disaccharides.
10	29	11. Select foods containing polysaccharides.

CARBOHYDRATES AND THEIR CONTRIBUTION TO THE DIET - PART II

ITEM NUMBERS RELATED TO OBJECTIVES	SLIDE NUMBER RELATED TO OBJECTIVES	SPECIFIC OBJECTIVES
		Upon completion of this unit the student should be able to:
1	2, 3, 7	1. Name six contributions of carbohydrates to the diet.
2	3, 4	2. Define glucose.
7	4	3. Discuss in a short paragraph the utilization of carbohydrates by the body.
2	5	4. Identify by selection the meaning of glycogen.
2	5, 6, 10	5. Identify the parts of the body where glycogen is stored.
3	10, 12	6. Tell what happens when excessive amounts of carbohydrates are consumed.
3	10, 12	7. Tell what happens when carbohydrates are not available for the body to use for energy.
4	13, 14	8. Discuss the statement "Carbohydrates act as sparing agents for protein."

ITEM NUMBERS RELATED TO OBJECTIVES	SLIDE NUMBER RELATED TO OBJECTIVES	SPECIFIC OBJECTIVES
5	17, 18	9. Identify what happens to the body when carbohydrate foods replace other essential foods in the diet.
6, 2	16	10. Discuss the function of cellulose in the diet.

OTHER NUTRIENTS FOUND IN CARBOHYDRATE FOODS - PART III

ITEM NUMBERS RELATING TO OBJECTIVES	SLIDE NUMBERS RELATING TO OBJECTIVES	SPECIFIC OBJECTIVES
		Upon completion of this unit, the student should be able to:
1	3	1. Name four food groups in which carbohydrates are classified.
3	4, 5, 7	2. Identify nutrients found in cereal grains.
2	4, 5, 7	3. Identify foods made from cereal grains.
4	9, 10, 11, 12	4. Select nutrients found in fruits and vegetables.
5	13	5. Identify nutrients found in legumes.
5, 7	14	6. Identify milk and milk products as the only animal source of carbohydrate.
5	2	7. Identify the primary function of carbohydrates.
6	6	8. Discuss the importance of enrichment of flour.

APPENDIX H

STUDENT OPINION SURVEY

STUDENT OPINION SURVEY

1. What do you like most about this method of presenting material about nutrition?
2. What do you dislike most about this method of presenting material about nutrition?
3. Have you ever used this method of learning in any other class?
4. Were you familiar with all of the words in the script?
5. What would you suggest to improve the script or recording?
6. What would you suggest to improve the slides or pictures?
7. Were the directions clear?

VITA Y

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