To the Graduate Council:

I am submitting herewith a dissertation written by Margaret Payne McCabe entitled "Nutrition Education Interests of Third-Grade Students." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Home Economics.

Jo Lynn Cunningham, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

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Graduate Studies and Research

NUTRITION EDUCATION INTERESTS OF THIRD-GRADE STUDENTS

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Margaret Payne McCabe

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ABSTRACT

Information from young children concerning their interests in educational goals and concepts can provide valuable information to professionals involved in curriculum development/evaluation. This study was designed to determine nutrition-related interests of young children, or, more specifically, to determine if (a) there were relationships between their nutrition-related interests and their knowledge, attitudes, and practices; (b) children agreed with nutrition education specialists concerning the importance of nutrition concepts; (c) children who scored higher on tests of nutrition-related knowledge, attitudes, and practices agreed more with nutrition education specialists than did those with lower scores; (d) there was agreement among children within nutrition education curriculum goals; (e) there were differences in nutrition-related interests of girls and boys; and (f) there were differences in nutrition-related interests of children attending rural schools and those in urban schools.

The study was conducted in collaboration with Tennessee's Nutrition Education and Training (NET) Program evaluation. Scores from tests conducted through the NET evaluation were used to measure nutrition-related knowledge, attitudes, and practices. A sample of 63 third-grade students in eight schools throughout East Tennessee was selected for the present study. Children in this sample were interviewed separately using a structured interview schedule including a picture Q-sort.

There were relationships between children's nutrition-related interests and knowledge and interests and attitudes, but not between their interests and practices. Third-grade children agreed with nutrition education specialists concerning which concepts were important to teach at third-grade level. Children with high scores on tests of nutrition-related knowledge, attitudes, and practices did not agree more with the specialists than did those with low scores. Third-graders did not demonstrate agreement within all goals. Further, there were differences in nutrition-related interests of girls and boys and differences in interests of children attending rural schools versus those in urban schools. Conclusions have implications concerning presentation of nutrition concepts to young children, the use of student input in curriculum development/evaluation, and methods of obtaining information concerning abstract subjects from young children.

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CHAPTER I

INTRODUCTION

With decreasing funds for education on the one hand and the push for accountability on the other hand, educational evaluation has become important as a method of determining the worth of educational endeavors. During the 1940's and early 1950's, Americans generally were willing to expend a relatively large amount of their financial resources on public education. Since then, however, we have witnessed several economic recessions that, in effect, have reduced the taxpayers' capabilities to pay for their schools. Not only did citizens begin to vote "no" when asked for more school-support money, but they also began to demand evidence that their tax dollars for schools were being spent well. Thus the era of educational accountability has dawned.

Not only is educational accountability a crucial concept at the local level but on a federal level as well. During the 1950's and 1960's, the financial support system for public education shifted from purely state and local support to include federal funds for special education purposes. In 1965 Congress enacted the Elementary and Secondary Education Act, a comprehensive and heavily funded law providing for thousands of federal grants to local agencies. This new law also contained provisions for mandatory evaluation of whether these local agencies were using federal grant money properly (Popham, 1975).

During the 1980's, federal funds for many of these grants are being withdrawn. With shrinking federal support, evaluation will

become even more valuable as a method for determining the worth of remaining programs. Further, if more responsibility for operation of educational agencies is to be assumed by state and local governments once again (as proposed), program development/evaluation will be a critical tool in reorganizing existing programs and/or creating new ones.

The concept of evaluation is not separated from that of program development in the recent literature. Evaluation is an integral part of the process of program development. There are several roles evaluators can and usually do play in regard to program development/evaluation--summative roles and formative roles (Scriven, 1967). Formative evaluation refers to assessment of worth focused on instructional programs that still are capable of being modified; summative evaluation refers to assessments of merits focused on a completed program (Popham, 1975).

Roles of evaluation are not to be confused with its purpose. The purpose of evaluation is to determine the value or worth of educational programs. There are at least three major schools of thought concerning how worth should be determined. In the first school of thought, evaluation is conceptualized as synonymous with professional judgment (Cronbach, 1963; Scriven, 1967; Stake, 1967); the second might be labeled as decision management strategies--i.e., strategies with primary emphasis on program description or data collection and storage for use by decision makers (Alkin, 1969; Stufflebeam, 1966). In the third major school of thought, evaluation is viewed as a decision-objectives strategy (i.e., a process of identifying and collecting information

to assist decision-makers in choosing among available decision alternatives) (Hammond, 1969; Metfessel & Michael, 1967). This is the definition of curriculum/development on which this study is based.

Curriculum Development/Evaluation Diagram

In a decision-objectives evaluation approach, the initial and most critical aspect of program development/evaluation is the identification of major goals of the program being evaluated. Outside evaluators can assist in conducting needs assessments to identify goals; they can help clarify the wording of these goals. However, the fundamental goals themselves ideally are formulated by people involved in and/or affected by the program on a day-to-day basis--teachers, curriculum specialists, administrators, parents, students, and members of the community (Cronbach, 1963; Scriven, 1967; Tyler, 1950). Tyler provided a curriculum model in which goals are developed using three sources: (a) social attitudes and trends, (b) information from specialists concerning appropriate subject matter, and (c) needs of the students.

System theory provides a framework for conceptualizing how information from these three sources can be used during the goal formulation and reformulation phases of an evaluation project; these phases, however, comprise only a portion of all the events required to execute a comprehensive evaluation. Figure 1 is a diagram of events in a curriculum development/evaluation project and interactions among personnel and clients involved in these events.

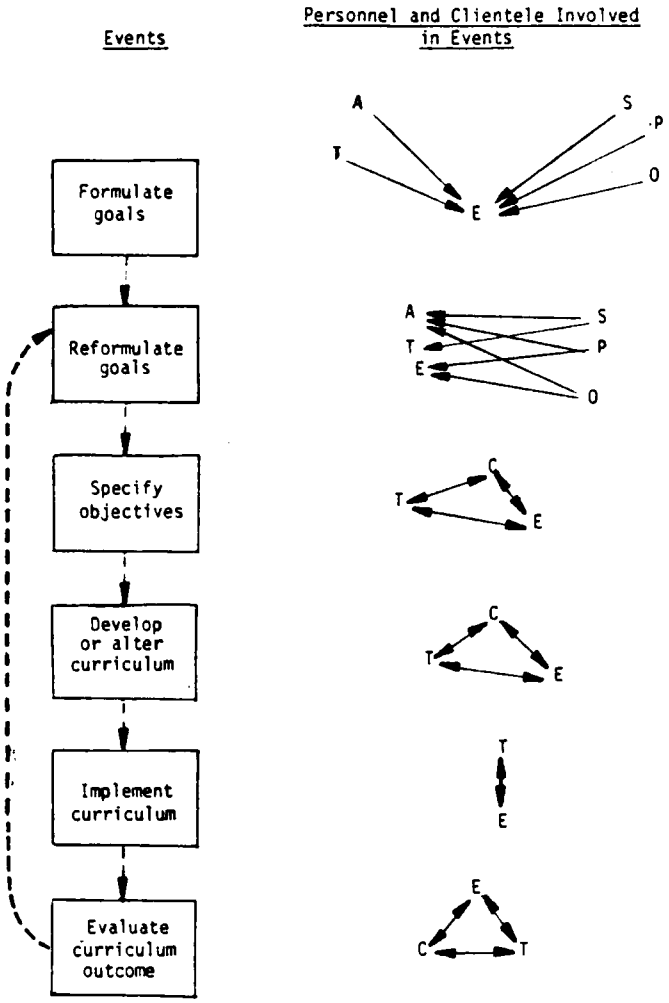

Figure 1. Events required for a curriculum development evaluation project and interactions among personnel and clientele involved in these events.

Key

= Events

= Sequence of events

= Interaction

A = Administrator
E = Evaluator
T = Teacher
C = Curriculum specialist
S = Students
P = Parents
O = Other community members

Curriculum Development/Evaluation Concepts

There are several concepts that are crucial in understanding the process of curriculum development/evaluation. These include the components of the process as well as the groups involved in it.

A general goal refers to the end, the result, or the achievement toward which effort is directed. Goals of a school or an educational program usually are stated in broad, abstract terms; nevertheless, these goals also should define the nature and character of the educational program in language that clearly indicates what kinds of growth and development should be fostered by the school or curriculum and what broad competencies and capabilities students should attain as a result of the educational process (Saylor & Alexander, 1974).

"Objectives state the specific, overt changes in student behavior that are expected to result from participation in a unit of learning activities" (Saylor & Alexander, 1974, p. 448). These instructional objectives constitute the basis for selecting specific learning activities, choosing content for use in the development of the activities, determining appropriate methods for developing learning activities, and evaluating student performance.

A curriculum is a plan for providing sets of learning opportunities to achieve broad goals and objectives for an identifiable population (Saylor & Alexander, 1974). Various groups of people are involved in the curriculum development/evaluation process. These groups are school personnel, evaluators, and clientele.

School personnel include administrators, curriculum specialists, and teachers. Administrators are defined as those educators who are involved in a curriculum development evaluation project at a decision-making level. Curriculum specialists are defined as consultants, either external or internal to the project, who have extensive and detailed knowledge of a particular subject area. Teachers are the interpreters, arbitrators, and guides in implementing the goals of the curriculum or educational plan. Any formal goal statements must be translated into learning opportunities for students. Guidance and development of such experiences primarily is the responsibility of the teacher (Saylor & Alexander, 1974).

The evaluator is a professional (or team of professionals) commissioned to determine the worth of a given educational program. As shown in Figure 1, the evaluator is involved in the entire process of curriculum development/evaluation. This is not always the case. Many times an evaluator is called in to make appraisals after the curriculum already has been developed. Determination of worth (or nonworth) may lead to termination, continuation, and/or improvement of an existing program. According to Popham (1975), "not only should the educational evaluator be responsible for appraising the worth of particular instructional programs as they affect learners involved, but the evaluator also should be attentive to the ultimate impact of the program and society at large" (p. 276). One of the criteria for a valid evaluation is the independence of the evaluator. In other words, the evaluator can make an honest appraisal (supported by valid data) without fear of jeopardizing his/her career.

The term clientele refers to students, parents, and community members (Tyler, 1950). Students are those learners who participate in and are affected by a particular curriculum. Parents include natural parents, adoptive parents, and guardians of those students who are participating in or are affected by a particular curriculum. Community members are those persons living and/or employed in the area (such as a school district).

Explanation of Diagram

The sequence of events represented in Figure 1 (i.e., formulate goals, reformulate goals, specify objectives, develop or alter curriculum, evaluate curriculum outcomes) is based on Tyler's model of curriculum development. Tyler stressed the importance of "evaluating the curriculum being developed, using the results of evaluations as a basis for continuing revisions to effect continuing curriculum improvement" (cited in Saylor & Alexander, 1974, p. 9). Tyler's model includes a goal reformulation step at the beginning of the curriculum development/evaluation process. To stress the role of goal reformulation in continuing curriculum improvement, this step also has been shown as the culmination of evaluating curriculum outcomes.

Role of administrators. Administrators' responsibility in curriculum development/evaluation is to decide what role the school or educational program can and should play in guiding the development of young people. In making this decision, administrators first gather information concerning the formulation of curriculum goals from students, parents, community members, and teachers through such methods

as surveys, informal interviews, and advisory council meetings. After formulating goals based on this information, they examine ideal goals in the light of resources and personnel available to carry them out. These considerations should be reflected in the next step--refining and evaluating goals. In some cases, the administrator also must decide from the evaluation report whether the curriculum being evaluated should be continued or discontinued, revised or left intact.

Role of teachers. Teachers are key personnel in the curriculum development/evaluation procedure; they are involved in every step of the process. To begin with, teachers are in a unique position to gather information concerning goal formulation in an informal manner (i.e., classroom observations, parent conferences, feedback from students, parents, and community members). Teachers also are involved in refining and evaluating goals as well as formulating them.

Further, teachers derive benefits from translating these revised goals into specific, attainable objectives (Worthen & Sanders, 1973). Often teachers who have become committed to a set of educational objectives that they thoroughly understand respond by developing a variety of learning experiences that are as diverse and as complex as the situation requires. In addition, participation of the teaching staff in selecting as well as constructing evaluation instruments has resulted in clarifying the objectives of instruction and in making them real and meaningful to teachers (Worthen & Sanders, 1973). In other words, there are advantages to involving teachers in as many aspects of the following steps in a curriculum development/evaluation project as

possible: (a) specification of objectives, (b) development or alteration of the curriculum plan, and (c) evaluation of curriculum outcomes. Also, teachers assume primary responsibility for implementation of the curriculum.

Role of curriculum specialists. Curriculum specialists as they are represented in this diagram have been defined as consultants who have extensive and detailed knowledge of a particular subject area. These specialists are employed during the objectives specification stage of a curriculum development/evaluation project to aid teachers and evaluators in formulating objectives that reflect important concepts in their subject area. They also help teachers and evaluators develop objectives that are developmentally appropriate.

Specialists can be particularly helpful in the stage of curriculum development. They can be employed to develop a plan of sequentially integrated instructional activities. A concentrated effort is needed for the construction of such a plan. Although teachers and evaluators also are involved in curriculum development, curriculum specialists can form the core group guiding this process.

Curriculum specialists also have a role in formative and summative evaluation. Their expertise is valuable in developing methods of measuring goal attainment as well as in restructuring objectives and redesigning the curriculum.

Role of evaluators. Evaluators, like the teachers, are involved in every step of a curriculum development/evaluation process. One of the most important functions of evaluators is to determine the business

or function of the particular educational program and what these educators are trying to accomplish (Bellon, 1980). To accomplish this, the evaluator asks the administrator(s) and teachers involved in the project to state the goals of the program. These stated goals reflect the program philosophy. The evaluator also seeks information concerning the needs and expectations of students, parents, and community members. Then the evaluator examines the stated goals of the program in light of needs and expectations of clientele involved in that program. Discrepancies between these stated goals and clientele needs and expectations form the basis for the next step in the curriculum development/evaluation process--refining and evaluating the goals.

The evaluators serve as catalysts in eliciting ideas for reformulation of goals from administrators, teachers, students, parents, and community members. Ideas from clientele can be gathered through surveys, informal meetings, and interviews. In addition, clientele can be involved directly in the reformulation process; they can be asked to participate in an advisory capacity either through an advisory council or through representation on the goal reformulation committee itself.

During this goal reformulation procedure, evaluators also provide guidance for the administrators in their task of examining ideal goals in the light of available fiscal and physical resources (e.g., space, time, and personnel). Further, evaluators have the responsibility of wording and distributing the final version of the refined and evaluated goal statements. From these reformulated goal statements, specific instructional objectives are developed by the evaluators, the curriculum specialists, and the teachers. In this process, the evaluator

serves in a management capacity (i.e., setting time schedules, providing necessary resources, editing objectives). The evaluator oversees the curriculum development/alternation phase of a project in much the same manner. During the next stage, implementation of the curriculum, the evaluator works closely with the teachers not only to ensure that the instructional plan is being followed but also to help create optimal learning conditions in each classroom (Bellon, Bellon, & Handler, 1977).

Although teachers and curriculum specialists are involved in developing and/or administering evaluation instruments, the evaluators assume primary responsibility for obtaining and evaluating curriculum outcomes. The evaluation diagram includes methods for gathering informal as well as formal data concerning curriculum outcomes. In other words, interviews and unstructured questionnaires as well as pencil-and-paper knowledge instruments are used in an attempt to obtain information concerning attitudes of clientele toward the program.

Role of community members. Implementation of an educational curriculum in a particular community has financial, social, cultural, and intellectual effects on that community. To begin with, all members of a community pay taxes for education whether they have children who participate in the educational program or not. Real estate prices are affected by the relative merit of educational programs in a given community. Further, skills and attitudes learned by students participating in an educational program either enhance or erode the intellectual, social, and cultural life of a community. Therefore, it is

important that community members have input into the curriculum development/evaluation process even if they do not have children attending that particular educational program. In the curriculum development/evaluation diagram, information from community members is used in formulating and reformulating goals. Evaluators and curriculum development/evaluation personnel solicit this information from community members both formally (e.g., by surveying them, involving representatives on committees and advisory councils) and informally (e.g., by using causal interviews, open-ended questions, and questionnaires).

Role of parents. As shown in the diagram, parents are involved actively in providing information (through surveys, interviews, representation on committees, advisory councils) to teachers, administrators, and educators concerning educational needs and expectations of students and the community at large. Implementation of a particular curriculum not only affects parents indirectly as community members but affects them more directly through their children as well. Most parents are interested in their children's intellectual, emotional, social, and physical welfare. An educational program is bound to influence either favorably or unfavorably these different areas of development.

Role of students. Students are affected most of all by the implementation of a curriculum. They not only are influenced by the planned curriculum of a particular educational program but also by the "hidden curriculum"--those organizational aspects of school life and the informal, interpersonal relations among the members of the school community that serve unofficially, and often insidiously, the function

of socialization (Snyder, 1970). Student input should be an important consideration in formulating, refining, and evaluating curriculum goals.

Need for Student Input

The overwhelming assumption among educators, historically and currently, is that a high degree of uniformity exists among the goals of the educational system, teachers, and students. However, this assumption is not justified. Students often establish their own goals and objectives and formulate their own desired outcomes from them without the help or cooperation from their school or teachers--another definition of "hidden curriculum" (Saylor & Alexander, 1974).

Educators need to consider students' goals and objectives if they are going to develop educational programs that are relevant to students (i.e., based upon students' needs and interests). Educators are faced with the sobering knowledge that past theories of curriculum planning have not worked either to effect education that is good enough for the times or to bring about professional consensus concerning what makes good education (Saylor & Alexander, 1974). During the 1980's, with the reduction in funds for development in education, educators are going to have to develop more efficient methods for gathering information from clientele in the area of curriculum development/evaluation. One aspect which needs to be emphasized is methods for obtaining student input during the goal formulation and reformulation steps in curriculum development/evaluation projects.

Traditionally, needs of students have been determined indirectly (i.e., using pencil-and-paper tests; collecting information from teachers, parents, administrators, and curriculum specialists) rather than directly (i.e., students' self-report). Very few evaluators have solicited information from students themselves in an attempt to determine how much students need or want to know, how much they perceive as beneficial, and how much they are able to absorb at a given time (Gifft, 1972). Several evaluators have used information from children fifth grade and up (Talmadge, Haertel, & Brun, 1981); however, input from younger children has not been solicited (Bellon, 1980). It is especially difficult for adults to anticipate the needs and interests of young children, how much they already know, and how much they are able to absorb at a given time. "It is curiously difficult to recapture preconceptual innocence; concept attainment seems almost an intrinsically unanalyzable process from an experimental point of view" (Bruner, Goodnow, & Austin, 1956, p. 50).

According to Piaget (1970), most children 7 or 8 years old are able to form mental representations of persons, objects, and events; they have the ability to think in concepts at a rudimentary level. More recently, researchers (e.g., Christie & Schumacher, 1975) have shown that children as young as 5 years old are far more capable of abstracting and producing relevant thematic information than previously has been assumed. Possibly Piaget's concept of egocentrism (the inability to differentiate between self and environment) does not characterize children's recall of verbally presented materials adequately (Christie & Schumacher, 1975). Therefore, it seems quite reasonable

to assume that children by the age of 7 or 8 can identify aspects of a content area that are relevant to them (i.e., what they need and want to know and what they perceive as useful or beneficial), especially in a content area such as nutrition. Food and food-related behavior are very much a part of their everyday world.

Recently there has been a decrease in federal funds for development and/or maintenance of nutrition education programs--another reason why more effective methods of evaluation are needed. Effective evaluation methods are especially critical in the area of nutrition education. For example, many nutrition specialists do not have expertise in educational practices or development principles (Skinner, 1981). In addition, educational evaluation based on measurable objectives is a relatively new phenomenon in health and health-related fields such as nutrition (Bellon, 1980; St. Pierre, 1981). Finally, there is no objective evidence that nutrition educators are instilling in learners sound nutritional practices and positive attitudes toward food and nutrition (Head, 1974; Schwartz, 1975; Sims, 1981). Input from students possibly could help remedy this situation by providing information that would help evaluators and nutrition specialists develop educational programs more interesting to students and more relevant to their needs.

Variables Influencing Student Input

Proponents of an interactionist theory of human development contend that forces both internal and external to the human being interact to produce human behavior. In the case of student input into goal formulation and reformulation phases of a curriculum development/

evaluation project, the following variables potentially interact with each other to produce variations in student input: (a) nutrition-related knowledge, attitudes, and practices of the student; (b) interests of the student; (c) gender of the student; and (d) setting of the school (i.e., rural vs. urban) the student attends.

Nutrition-Related Knowledge, Attitudes, and Practices

Knowledge, attitudes, and practices represent the cognitive, affective, and behavioral components of nutrition-related beliefs. Beliefs are statements accepted as truth that predispose an individual to think, feel, perceive, and behave toward a referent (a cateogory, class, or set of phenomena) in a certain manner (Rokeach, 1973).

Several different factors influence nutrition-related attitudes and practices of elementary school students. To begin with, the family unit still exerts a great deal of influence on nutrition-related attitudes of the elementary school child (Burt & Hertzler, 1978; Eppright, Fox, Fryer, Lampkin, & Vivian, 1970; Yperman & Vermeersch, 1979). The knowledge, attitudes, and practices of their teachers also affect nutrition-related attitudes and practices of elementary students (Perkins, Roach, & Vaden 1980); there is some evidence pointing to the importance of the "school atmosphere" as it affects students' attitudes toward nutrition and nutrition education as well (Lund & Burk, 1969; Perkins, Roach & Vaden, 1980). Knowledge, attitudes, and practices of peers also is a strong factor influencing the attitudes of elementary school children toward nutrition and nutrition education (Yperman & Vermeersch, 1979) as well as food-related information viewed on television (Schramm, Lyle, & Parker, 1961).

Nutrition educators have assumed that knowledge of nutrition will lead to improved dietary practices. However, the correlative link between knowledge about nutrition and dietary intake is sketchy, at best (Sims, 1981). There is little evidence in the literature of changes in eating habits after students have received nutrition education (Smith & Justice, 1979). One reason for these results may be that most educational programs are aimed solely at the cognitive level and ignore personal attributes, such as as attitudes, that also exert strong influences on nutrition-related practices (Sims & Smiciklas-Wright, 1981).

Interests of the Student

Interest has been defined as a feeling of intentness, concern, or curiosity about something (Webster's, 1972). Interest also implies importance or consequence. From this definition it would seem that interests are related to attitudes. Attitudes influence interests and vice versa. The definition of motivation as an "inner influence on behavior" includes both the words "interests" and "attitudes" (Munn, Fernald, & Fernald, 1969). Further, interest is seen as an important force in children in the motivation of acquisition of knowledge (Christie & Schumacher, 1975; Greene & Lepper, 1974; Zivin, 1974). In summary, seemingly the interests of elementary school children influence their input concerning curriculum goal formulation and reformulation both indirectly (i.e., by affecting nutrition-related knowledge, attitudes, and practices) and directly (i.e., by dictating the relative importance of nutrition education goals and concepts).

Gender of the Child

Gender is one of the most basic of status characteristics; in terms of both interactions with people and position in society, gender is exceptionally important. Gender-role socialization begins the day a child is born and continues throughout life (Hyde, 1979). It is probable that children's interests are influenced by gender. There is some evidence that gender affects nutrition-related attitudes (Yperman & Vermeersch, 1979) as well as knowledge and practices (Eppright et al., 1970; Lund & Burk, 1979).

Setting of the School the Student Attends

Further, there is some evidence that nutritional status (influenced by dietary practices) as well as food preferences (related to attitudes) of the elementary school child are affected by the school setting (rural vs. urban) (Eppright et al., 1970; Lund & Burk, 1969; Walker, Hill, & Millman, 1973). There is evidence that school setting also influences students' positive feelings about themselves (Gump, 1975). In addition, it seems likely that urban students' interests may be different from those of rural students. Therefore, all of these factors (i.e., nutrition-related knowledge, attributes, and practices; gender; and urban vs. rural school setting) may affect student input concerning the importance of nutrition education goals and concepts.

Assumptions

This study was based on the assumption that information from young children concerning the relevance of educational curriculum

content material to their lives (i.e., what they need or want to know and what they perceive as useful or beneficial) would be valuable for persons involved in the area of curriculum development/evaluation. It was assumed that nutrition is important to health and that nutrition concepts can and should be taught to young children. It was assumed that there are conceptual interrelationships among nutrition-related knowledge, attitudes, and practices but that each of these phenomena can be considered as a separate entity.

Research Questions

The purpose of this study was to determine children's understanding of nutrition, their perceptions of nutrition, and their ideas about nutrition education. More specifically, the study was based on the following research questions:

1. Is there a relationship between nutrition-related knowledge, attitudes, and practices and nutrition concepts considered important by primary school students?

2. Is there a difference between categories of nutrition concepts considered important by nutrition education specialists and those concepts considered important by primary school students?

3. Do children with higher scores on tests of nutrition-related knowledge, attitudes, and practices have more interest in nutrition concepts considered important by nutrition education specialists than do children with lower scores?

4. Is there agreement among primary school children within nutrition education goals?

5. Are there differences in nutrition-related interests of girls and boys?

6. Are there differences in nutrition-related interests of children attending rural schools and those in urban schools?

CHAPTER II

LITERATURE REVIEW

This study is interdisciplinary in scope. Information has been obtained from the following bodies of literature: (a) educational evaluation, (b) nutrition education, and (c) child development. Relevant topics include (a) the concept of curriculum development/evaluation, (b) curriculum development/evaluation in the field of nutrition, (c) expertise of nutrition educators, (d) effectiveness of nutrition education programs, (e) the role of students in curriculum development/evaluation, (f) cognitive development during middle childhood, (g) characteristics of children during middle childhood (including attitudes toward school and gender differences during middle childhood), and (h) nutrition-related competencies of children during middle childhood.

The Concept of Curriculum Development/Evaluation

During the first two decades of this century, evaluation largely was equated with psychological testing and measurement (Popham, 1975). In the 1927 Yearbook of the National Society for the Study of Evaluation, Rugg (1927) identified the first step in the task of "curriculum-making" as the determination of fundamental goals. Tyler (1950) provided a model in which goals were developed using three sources: (a) the needs of the students, (b) social attitudes and trends, and (c) information from specialists concerning appropriate subject matter. After goals had been developed from this information, they were evaluated at the beginning of the curriculum development project using

two screens: a philosophy of education and psychology of learning. Then accepted goals were broken down into precise objectives and the program as a whole was evaluated on the basis of goal attainment. More recently, through the work of others (e.g., Alkin, 1969; Cronbach, 1963; Eisner, 1967; Provus, 1971; Scriven, 1967; Stake, 1967, Stufflebeam, 1974), the concept of curriculum evaluation has been expanded from that of measurement of objectives to comprehensive assessment of all aspects of an educational program (Bellon et al., 1977). Scriven (1967) has emphasized the importance of continuous evaluation and screening of goals throughout the entire curriculum development process, not merely as an initial activity.

Curriculum Development/Evaluation in the Field of Nutrition

Interest in curriculum development/evaluation is a relatively recent phenomenon in the health sciences (Bellon, 1980; St. Pierre, 1981). Curriculum development/evaluation in the field of nutrition received attention in the recent past because of the endorsement of nutrition education by the federal government. Increased interest and investment in nutrition education has been justified by the American public's increasing need for assistance in making nutritionally wise food choices because of the following factors: (a) the increasing complexity, expense, and confusion for consumers characteristic of the food supply; (b) the many nutrition-related degenerative diseases taking a heavy toll in lives and consuming a large portion of the health care budget; (c) the increasing responsibility for the prevention and even remedies for health problems being placed on individuals

(in the form of everyday choices about what to eat) rather than only on doctors or other professionals. In summary, the American public must be able to take responsibility for its own nutritional well-being. Nutrition educators in the public schools have attempted to accomplish this aim by improving nutrition-related knowledge, attitudes, and practices. However, until recently, elementary school nutrition education programs were few and their impact was not evaluated in behavioral terms (St. Pierre, 1981).

The largest and most recent nutrition education effort was initiated in November 1977 when the Nutrition Education and Training (NET) program was established with the passage of Public Law 95-166. Under this law, states were authorized to carry out comprehensive nutrition education to provide training in nutrition for education and food service personnel, training in food service management for food service personnel, and nutrition education activities in schools and child care institutes (Glotzer & Nestor, 1980). Since passage of the Elementary and Secondary Education Act in 1965, it has been mandatory that programs receiving federal funding be held accountable for their funds through educational evaluation (Popham, 1975).

Educational evaluation in the field of nutrition education is still in its infancy (Talmadge, Hughes, & Eash, 1978). To begin with, there is no agreement among educators on the purposes of nutrition education nor is there consensus on desired outcomes (i.e., desired nutrition-related behavior) from nutrition education programs. Further, measurement of nutrition education outcomes is imprecise; the two most

common behavioral measures, dietary recall and observation of school plate waste, both are subject to major measurement error (St. Pierre, 1980). Most importantly, a theoretical and conceptual framework for nutrition education and evaluation must be developed. It is especially important that valid conceptualizations and effective methology be used in the area of nutrition education because very few elementary teachers are trained adequately to teach nutrition (Carver & Lewis, 1979; Cook, Eiler, & Kaminaka, 1977; Petersen & Kies, 1972) and presently there is not objective evidence that nutrition education programs already in existence are changing nutrition knowledge, attitudes, and practices (Sims, 1981).

Expertise of Nutrition Educators

Many of the professionals coordinating state nutrition education projects are nutritionists who have limited expertise in educational practices or developmental principles (Skinner, 1981). On the other hand, nutrition expertise brought by elementary school teachers to the classroom is minimal; current teacher preparatory programs seldom include courses in nutrition (Carver & Lewis, 1979). Even inclusion of nutrition courses in teacher preparatory courses, however, does not necessarily result in greater knowledge of the subject matter or how to present it to students (Petersen & Kies, 1972). Consequently, "higher education should ask not only what classroom teachers know about nutrition but also what college teachers who teach the classroom teachers know about children and how they learn" (Maretzki, 1979, p. 177). One method of combining valid developmental and educational

principles with accurate nutrition information is to develop a nutrition education curriculum guide.

Indeed, carefully designed curriculum guides have been developed in connection with the Nutrition Education and Training Program (NET) in several states (e.g., California, Connecticut, Tennessee). Teachers involved in NET training workshops throughout Tennessee said they considered Tennessee's instructional plan a valuable classroom guide to teaching nutrition education in grades K-6; one feature of the plan they liked especially was the presentation of developmentally appropriate activities to augment the teaching of each nutrition concept (Banta, McCabe, Bittle, Cunningham, Freeman, Jozwiak, Peccolo, Roberson, & Skinner, 1981). Further, nutrition education journals are replete with ideas for making nutrition concepts more relevant for students and teachers alike (Thompson, 1981)--ideas such as (a) "futures techniques" applied to nutrition education (Barker & Barker, 1977), (b) environmental education applied to nutrition education (Rye, Kalasa, & Stonehouse, 1977), (c) nutrition education combined with a reading enrichment program (Lowenberg, 1978), (d) vegetable parades used in an attempt to increase vegetable consumption (Kofacher & Brenner, 1976), and (e) dance activities used to teach nutrition (Jeanné & Kaufman, 1981). These strategies and others may augment the expertise of nutrition educators; however, they may not necessarily increase the effectiveness of nutrition education programs.

Effectiveness of Nutrition Education Programs

Positive change in knowledge, attitudes, and practices as they are related to food and nutrition has been the aim of most nutrition

education programs. However, in actuality, the majority of nutrition educators have been concerned mainly with the knowledge aspect of this goal; there is no objective evidence that nutrition education is instilling in learners sound nutritional practices and positive attitudes toward food and nutrition (Schwartz, 1975; Sims, 1981).

> A highly cognitive theory of the casual relationship between education and health status postulates that children first need to learn new information that is designed to affect their health; then this information has to affect their beliefs and feelings about specific nutrition-related behaviors; this new predisposition then has to affect the nutritional behaviors in question. (St. Pierre, 1981, p. 14)

Swanson (1972), however, has contended that the relationships among knowledge, attitudes, and practices are not this consistent--or this simple. Indeed, research concerning the relationships among nutritional knowledge, attitudes, and food habits (practices) is conflicting and inconclusive (St. Pierre, 1981). There does seem to be some connection between knowledge and attitudes; for example, Sims (1976) found a "nutrition is important" attitude to be a reliable predictor of nutrition knowledge. However, no consistent relationship between nutrition knowledge and food-related behavior has been discovered (Foley, Hertzler, & Anderson, 1979).

Food habits are influenced by a complex array of variables, including geographical location, ethnic and cultural heritage, religion, early food experiences, physical characteristics, age, gender, socioeconomic status, peer pressure, mealtime atmosphere, and other factors (AuCoin, Haley, Rae, & Cole, 1970; Lowenberg, 1974; Sanjur & Scoma, 1971). Attitudes may be an important link in the translation

of knowledge to practices. However, in the general public, a positive attitude toward nutrition does not necessarily become translated into sound nutrition practices (Sims, 1981).

In one study, a "nutrition is important" attitude in teachers did not necessarily become translated into a personal willingness or interest in teaching nutrition (O'Connell, Shannon, & Sims, 1981). However, in other studies (Shannon, Marbach, Graves, & Sims, 1981; Skinner, 1979), teachers positive attitudes toward and increased knowledge of nutrition have been related to student gains in nutrition knowledge. In still another study (Perkins, Roach, & Vaden, 1980), teachers' positive attitudes about food quality and negative attitudes about eating with the students emerged as predictors of student participation in the school lunch program. In summary, research concerning teacher attitudes is inconclusive. This area seems to be a promising one for further research; teachers' attitudes and behaviors in general can exert a powerful influence on those of their students--especially during primary school years.

Much work has been done in assessing food preferences and food habits of children during the preschool and early elementary school years (Birch, 1979; Breckenridge, 1959; Bryan & Lowenberg, 1958; Walker, Hill, & Millman, 1973). However, little assessment of children's attitudes toward nutrition per se or toward nutrition as a field of study has been done (Foley, Hertzler, & Anderson, 1979). When asked to respond to a questionnaire developed by the Tennessee NET evaluation team designed to measure perceptions of nutrition education,

most respondents (over 85%) in grades K-3 said they liked learning about "foods that are good for you" (Banta et al., 1980). It seems that greater knowledge of children's attitudes toward nutrition and nutrition education would be helpful in increasing the effectiveness of current nutrition education programs and useful to those designing programs in the future.

The Role of Students in Curriculum Development/Evaluation

Saylor and Alexander (1974) have stressed the value of students' input in goal evaluation. Gifft (1972) also has discussed the importance of students' input in determining not only how much students already know but also how much they need or want to know, how much they perceive as useful or beneficial, and how much they are able to absorb at a given time. Knowledge of the structure of attitudes toward nutrition could assist the nutrition educator in evaluating students' needs and interests and presenting nutrition information in language relevant to their needs and interests (Baird & Schutz, 1976). A few evaluators have used student input from older children (5th grade and up) in goal screening (Bellon, 1980). Younger children as well should be able to provide useful information, especially in the area of food and food-related behavior. The ability of young children to provide such information seemingly is influenced by the characteristics of their developmental stage, including their cognitive development.

Characteristics of Children During Middle Childhood

Information from children concerning goal formulation and reformulation probably is influenced by developmental characteristics associated with the middle childhood (defined here as the period from 5 or 6 years to the age of 11 or 12 years), including their stage of cognitive development. Middle childhood is a time of expanding horizons; although home still is an important place, children enter school where they spend a good portion of their waking hours for the next 10 years or more. With entrance into school comes a heightened awareness of body image and physical, social, and cognitive abilities (self-concept). An individual's self-concept, in part, is derived from "reflected appraisals" of others (Mead, 1934). During middle childhood, children become increasingly susceptible to appraisals of peers and tend to evaluate themselves accordingly (Allen & Newston, 1972; Bradley & Newhouse, 1975). Peer groups become more cohesive during this time; they tend to be focused on specific activities such as forming a club, taking a hike, or building a fort (Hartup, 1970).

Cognitive Development

Around the age of 6 or 7, children gradually develop new mental abilities that Piaget (1968) has called concrete operations. These abilities are important in expanding the conceptual world of the school-aged child. With the development of concrete operations, children begin to form concepts of classes, relations, and numbers. The development of concrete operations also affects other cognitive abilities such as perception, language, and memory. As children reach

the age of 8 to 9 years, their perception has become more rapid and efficient (Meyer, 1978; Miller, 1972; Vurpillot, 1968); they are able to organize their perceptions according to logical processes (Lasky, 1974; Smith, 1979). During middle childhood, there seems to be a substantial increase in verbal communication skills (Bereiter, Hide, & Dimitroff, 1979; Ironsmith & Whitehurst, 1978; Olson, 1975) as well as a great deal of growth in vocabulary and syntactic understanding (Chomsky, 1969; Palermo & Molfese, 1972; Sinclair-deZwart, 1969; Slobin, 1966). Storage and retrieval of information, skills crucial to memory development, improve with age (Conrad, 1971; Flavell, 1970; McCarver, 1972); they seem to be related to attainment of concrete operations (Nelson, 1974).

Attitudes Toward School

Focusing on specific activities is an important aspect of a child's striving for mastery. Erikson (1950) has characterized the elementary school years as the time when children form either a sense of industry or a sense of inferiority. It would seem that experiences in school are important factors influencing the development of a sense of industry vs. feelings of inferiority. Two factors that appear to affect children's experiences in school are the size of the school and its educational policies. Students attending small schools have reported more positive feelings of developing competence, being valued by others, and participating in important group efforts (Gump, 1975). Teaching methods can influence a child's enthusiasm for and interest in learning (Asher & Markell, 1975; Silberman, 1970). Other factors that seem to affect children's attitudes toward school are their

parents' attitudes toward school and education in general (Katskovsky, Preston, & Crandall, 1964; Greenberg & Davidson, 1972); teachers' attitudes toward school and, more importantly, toward students themselves (Rosenthal, 1973); and students' perceptions of their performance in school in comparison to the performance of their peers (Ruble, Feldman, & Boggiano, 1976).

Gender Differences

Middle childhood seems to be an important time in the development of a child's gender role identity (Kohlberg, 1966; Martinson, 1973). There is some evidence that males tend to be more aggressive and have better quantitative and visual-spatial abilities, whereas females excel in verbal ability (Maccoby & Jacklin, 1974). Research in this area still is inconclusive, though. For example, Bandura and Perloff (1968) did not find boy-girl differences in academic achievement at the elementary school level. However, more recently, Harter (1975) in a study involving 4-to 10-year-olds found that mastery motivation (the desire to solve problems for the sake of discovering the solution) was the major determinant for achievement in older children, particularly boys. Need for approval (responsiveness to social reinforcement) was more important for girls than for boys.

Nutrition-Related Competencies of Children During Middle Childhood

Cognitive development and characteristics of children during middle childhood (including their attitudes toward school and gender differences) are potential factors influencing their nutrition-related

competencies and, therefore, their ability to provide input during goal formulation and reformulation phases of curriculum development/evaluation projects. Food and food-related behavior are very much a part of the daily lives of young children. Lessons in food-related behavior begin in infancy; food habits are fairly well established by the time children are 7 or 8 years old (Gifft, 1972).

Birch (1979) has demonstrated the feasibility of obtaining nutrition information from very young children. In fact, she found that children as young as 3 years of age were willing and able to express their preferences regarding food. Emmons and Hayes (1973) found that elementary school children 6 to 12 years old have the ability to recall their 24-hour food intake accurately, perhaps even more accurately than their mothers recalled their child's intake.

In a study involving semiclinical interview procedures similar to ones used by Piagetian researchers, Contento (1981) found children from 5 to 11 years old willing and able to discuss their conceptions of food and the process of eating as well as food preferences and food choices. Although the sample in this study was relatively small (a total of 34 students), the responses were rather consistent within categories from the in-depth interviews. Children were classified as "preoperational" vs. "concrete operational" on the basis of two standard Piagetian tasks concerning conservation and classification skills. Operational students consistently made distinctions between "food" and "snacks." Only 2 of the 24 concrete operational subjects understood that vitamins are assimilated into the body, but even these 2 students did not understand the relationship between vitamins and food.

Although all but one of the concrete operational children understood that food is changed in some way in the stomach, they differed on what they thought happened after the transformation. For example, some of these children knew that food was "transformed before bringing about its desired effect at a remote location such as the arm muscles, but they did not know how the effect was brought about" (p. 88). Others thought of the changed food as being transported to other parts of the body as "small ants," "mush," or as "little pieces" that "grow big and make you stronger." Only a few children mentioned words such as protein, vitamins, minerals, or other nutrients in describing transformations food undergoes during digestion. Finally, concrete operational subjects listed fruits, vegetables, and meat as foods "good for you." Most students said that food makes you "strong," "healthy," or "made you grow," but they could not describe why or how this occurs.

Summary and Conclusions

The concept of educational development/evaluation has been expanded greatly during the past decade to include various techniques for obtaining input from clientele, especially during the stages of goal formulation and reformulation. Information from students has not been solicited as regularly as has information from administrators, teachers, curriculum specialists, parents, and other members of the community. Students' input during the goal formulation and reformulation stages of nutrition education curriculum development/evaluation is especially valuable. The American public must be able to take responsibility for its nutritional well-being. Nutrition educators

have attempted to accomplish this aim by improving nutrition-related knowledge, attitudes, and practices. However, there is no objective evidence that nutrition education programs in existence actually are changing nutrition knowledge, attitudes, and practices (St. Pierre, 1981). Further, very few people are trained adequately in the area of nutrition education; nutritionists usually do not have a developmental background, and developmentalists lack an adequate knowledge of nutrition (Skinner, 1981). Information from children, especially young children, could be extremely helpful in translating abstract nutrition material into concepts that are developmentally appropriate.

Young children seem willing and able to express themselves concerning food and food-related matters (Birch, 1979; Contento, 1981; Emmons & Hayes, 1973). Further, changes in perception (Meyer, 1978; Miller, 1972; Vurpillot, 1968), language (Bereiter, Hide, & Dimitroff, 1979; Chomsky, 1969; Ironsmith & Whitehurst, 1978; Olson, 1975; Palermo & Molfese, 1972; Sinclair-deZwart, 1969; Slobin, 1966), and memory (Conrad, 1971; Flavell, 1970; McCarver, 1972) seem to increase cognitive competence during middle childhood. It is probable that characteristics of children during middle childhood, including stage of cognitive development, influence their nutrition-related interests. Also, because middle childhood seems to be an important time in the development of gender-role identity (Kohlberg, 1966; Martinson, 1973) and the emergence of gender differences (Harter, 1975; Maccoby & Jacklin, 1974), it seems likely that gender may influence children's nutrition-related interests. Further, because attitudes toward school seem to be an important phenomenon during middle childhood (Erikson,

1950; Gump, 1975), school setting (i.e., rural vs. urban) also may affect nutrition-related interests.

CHAPTER III

METHODOLOGY

The Tennessee Nutrition Education and Training (NET) Program was a component of a national effort to develop a coordinated nutrition education program for children from preschool through Grade 12. This effort received funding through the United States Department of Agriculture in connection with Public Law 95-166. Under this law, the National School Lunch Act and Nutrition Amendments of 1977 were added to provide for a program of "nutrition education and training." Legislators authorized federal funds to be allocated to state agencies through a system of grants. Directors of agencies receiving these grants were responsible for (a) providing training in nutrition for educators and food service personnel, (b) providing training in food service management for school food service personnel, and (c) conducting nutrition education activities in schools and child care institutions.

In 1979, Tennessee's State NET Advisory Council recommended that the initial thrust of NET activities in Tennessee be directed toward teachers and food service personnel in elementary schools. This approach offered the possibilities of reaching large numbers of individuals readily and changing food habits at the time these food habits were being formed. The advisory council also recommended using a team approach to provide nutrition education training throughout Tennessee during 1980-81.

In the fall of 1979, the Tennessee Department of Education contracted with professionals in the College of Home Economics and the College of Education at The University of Tennessee, Knoxville, to carry out two projects: (a) to develop a nutrition education competencies framework and corresponding instructional plan and to provide instruction in the use of this plan to teams of elementary school teachers and food service personnel in a series of workshops and (b) to evaluate the impact of these workshops as well as of other nutrition education activities throughout Tennessee. There were two different project teams (i.e., the objectives project team and the evaluation project team) to accomplish these goals. However, an interdisciplinary core of individuals (i.e., persons competent in nutrition and food science; human development; early childhood, elementary, secondary, and adult education; and statistics and research methods) worked with both projects.

As a basis for a sequential and integrated approach to nutrition education, a goals and objectives framework (grades K-12) (Skinner, Cagle, Cunningham, Miller, & Teets, 1980) was developed. This framework (see Plate 1) was the basis for Tennessee's nutrition education instructional plan and also for an assessment instrument, the Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices (CANKAP) with 11 forms for different groups (Cunningham, Skinner, Cagle, Miller, & Teets, 1981).

A treatment-control group design was used to assess the impact of the NET workshops. Nutrition-related knowledge, attitudes, and practices of children in grades K-12 (as well as various adult groups)

were measured using the CANKAP. A sample of 48 schools stratified by development district and school setting (i.e., rural and urban areas) was selected to participate in this assessment.

Hypotheses

The present study was designed to test six hypotheses. These were as follows:

1. There are relationships between children's nutrition-related interests and their nutrition-related knowledge, attitudes, and practices.

2. There is a difference between nutrition concepts considered important by nutrition education specialists and those nutrition concepts considered important by primary school students.

3. Children with higher scores on tests of nutrition-related knowledge, attitudes, and practices were more interested in nutrition concepts considered important by nutrition education specialists than do children with lower scores.

4. There is agreement among children within nutrition education goals.

5. There are differences in nutrition-related interests of girls and boys.

6. There are differences in nutrition-related interests of children attending rural schools and those in urban schools.

This study also was designed to provide information concerning children's understanding and perceptions of nutrition and their nutrition interests. Thus, the study was designed to be hypothesis generating as well as hypothesis testing.

Design

To test the first hypothesis, a correlational design was used. Variables included children's nutrition-related knowledge, attitudes, and practices.

To test the second hypothesis, a one-factor design was used. The independent variable was level of concept designated by nutrition education curriculum specialists; the two levels were third-grade level and other grade levels. The dependent variable was concepts considered important by primary school children.

The third hypothesis also was investigated using three one-factor designs. The independent variables were children's scores on tests of nutrition-related knowledge, attitudes, and practices, respectively; scores above the median were "high" scores and those below the median were "low" scores. The dependent variable was children's rankings of nutrition concepts designated as third-grade level by nutrition education specialists.

For the fourth hypothesis, another one-factor design was used. The independent variable was goal designated by nutrition education curriculum specialists; there were four levels (Goals I, II, III, and IV). The dependent variable was children's interest in nutrition concepts.

To test the fifth and sixth hypotheses, one-factor between-group designs were used. Independent variables were gender and school setting (i.e., rural and urban), respectively. The dependent variable was children's nutrition-related interests.

Other variables also were investigated in this study. These variables included: (a) children's definitions of nutrition, (b) children's ideas concerning nutrition concepts interesting to other children their age, and (c) children's perceptions concerning the relative importance of nutrition concepts.

Sample

A sample of 63 third-graders from eight schools already participating in the 1981 NET assessment (four rural schools and four urban schools) in Development Districts 1-4 (East Tennessee) was selected to participate in this study. Selected schools varied with regard to grade spread and number of teachers (see Table 1), as well as atmosphere (i.e., cheerfulness vs. drabness; responsiveness of teachers and third graders to the researcher; rapport among teachers and among teachers, children, and administrators).

Letters were written to the participating third-grade teachers 3 weeks in advance of the 1981 NET assessment explaining the purpose of the present study and the procedures involved; their help and cooperation were requested. A week later these teachers were contacted by telephone. At this time, if they agreed to participate in the study, they were asked to send informed consent forms enclosed in the initial letter home with all the children in their classes. These consent forms (see Appendix A) were to be signed by the parents and returned to the teacher before the NET testing date for that particular school. Children were selected randomly by the researcher from a

Table 1

Grade Spread and Number of Teachers in Schools Selected for the Sample

School	School setting	Grade spread	Number of teachers
Brownlow	Urban	K-6	17
Chilhowee View	Rural	K-8	25
Copper Hill	Rural	K-8	14
Crossville	Urban	K-6	5
Indian Springs	Urban	K-6	37
Madison	Urban	K-6	25
Pamona	Rural	K-6	5
South Polk	Rural	K-8	26

list of those third-graders who had returned permission slips to their teachers by the NET testing date. A brief consultation was held with each third-grade teacher to assure that none of the children selected were performing below grade level.

The sample of 63 third-graders interviewed for this study included 35 girls and 28 boys; 31 of these children attended rural schools and 32 were in urban schools. The uneven ratio of girls to boys resulted because more girls than boys had returned their permission slips to their teachers by the date set for NET testing.

Instrumentation

Two different types of instrumentation were used in this study. Instruments included tests designed to measure nutrition-related knowledge, attitudes, and practices and an interview schedule designed to elicit responses of third-grade children concerning (a) their definitions of nutrition, (b) their nutrition-related interests and their ideas concerning nutrition concepts interesting to other children their age, and (c) their perceptions concerning the relative importance of nutrition concepts.

Tests of Nutrition-Related Knowledge, Attitudes, and Practices

A test of nutrition-related knowledge, attitudes, and practices (CANKAP) was administered to third-grade children participating in Tennessee's NET evaluation by specially trained field assistants. During administration of the tests, each child had a copy of the grade 3 instrument with printed questions and response alternatives.

However, items were read to the children by the field assistant; children marked their answers directly on the instrument (see Appendix B for copy of the instrument, manual for administration, and answer key). Instruments administered to third-grade children had been validated and tested for reliability. Cronbach's alpha reliability coefficients for the knowledge, attitudes, and practices scales were reported as .70, .42, and .47, respectively, for a sample of 787 second- and third-grade children from throughout Tennessee (Cunningham et al., 1981).

Interview Schedule

The interview schedule used for this study, the Children's Interests in Nutrition Education Concepts (CINEC), was developed and validated during a pilot phase. The initial pilot phase of the study took place during summer of 1980 in a local day care center for school-age children. Some 25 children in grades 1 through 5 were interviewed using a variety of questioning strategies. Children scheduled to attend third grade during that fall were the youngest in this group of children to respond consistently to questions involving abstract concepts. Further, third-grade children were able to express their thoughts better concerning the relative importance of nutrition concepts using a Q-sort technique than were younger children. Pictures seemed to help children discuss abstract concepts by making these concepts more concrete. In addition, shy children as well as more outgoing ones seemed to perform equally well using this approach.

Although the Q-sort is a method developed and employed primarily by psychologists in clinical situations, it also is useful as a tool to measure attitudes in educational settings. This technique was used successfully by Humphreys (1975) to measure high school students' attitudes toward achievement in science. A Q-sort also was used by Sutnick (1981) to measure attitudes of junior high school students concerning food preferences and nutritive value of foods. Fitzgerald (cited in Sutnick, 1981) devised a "food choice game" for adults based on the Q-sort method; this game involved sorting laminated cards with pictures of food on them along several different dimensions corresponding to variables being investigated in the study. The interview schedule used for the present study also was based on a Q-sort technique with pictures.

The process of developing picture concept cards for the Q-sort used in this study involved the following steps: (a) identifying nutrition topics to be translated into concept cards, (b) translating nutrition topics into concept card captions, and (c) finding pictures to represent the concept card captions. First, topics from the goals and objectives framework for nutrition education (grades K-12) (Skinner et al., 1980) were selected for pictorial representation. It was decided that 20 topics would be represented; it seemed probable that third-graders would have difficulty manipulating a larger number of Q-sort cards than this. These 20 topics were chosen from different goals and from different grade levels (see Appendix C).

After topics for the Q-sort had been selected, the wording of the topics was examined to determine whether or not it was appropriate for

third-grade students. In some instances the language used in the topic was not changed. However, the wording of most of the topics used was altered to some extent. For example, the topic "steps involved in the process of food production, distribution, and consumption" was changed to the caption "how food gets to us."

Once captions such as this had been developed, pictures were selected to represent the concept behind each topic. The majority of the pictures selected were located in magazines dealing with homemaking. Often several pictures were combined in a collage to represent the concept. Pictures were posted on square pieces of poster board 12" by 15" and covered with a protective layer of clear contact paper. Photoreductions of these picture concept cards are given in Appendix D.

The interview schedule for this study also was designed to elicit some open-ended as well as structured responses concerning children's perceptions of nutrition and the importance of various nutrition education concepts. The open-ended response section is based upon the following features of a tutorial exchange strategy developed by Blank (1973): (a) flexibility in questioning to allow teachers to incorporate student statements and ideas into a teaching/learning situation and (b) enough structure to provide guidance for teachers in encouraging students to pursue the task at hand. Ideas from the approach were helpful in education from children creative responses to open-ended items in a relatively short standard period of time. The basic instrument used in this study appears in Appendix D.

A check for reliability of the instrument was performed using a test-retest method. A sample of 10 children from a day care facility other than one used for the first pilot phase were interviewed and then interviewed again 3 weeks later to determine the consistency of their responses. Overall responses were relatively consistent ($r_{tt}(10) = .86$); however, there was wide variance in reliability for individual Q-sort items (see Table 2). The most consistent responses ($r_{tt}(10) > .80$) were given for the following items: (a) "nutrients in foods," (b) "energy and nutrients," (c) "how food looks and tastes," (d) "what other people tell us about food," (e) "how food gets to us," (f) "world food problems," and (g) "how to learn about nutrition."

Participants in the pilot study were asked to make comments concerning the clarity of questions and instructions comprising the interview schedule. To establish content validity of the instrument, persons competent in the areas of human development and nutrition education examined preliminary Q-sort concept cards and interview questions. Their suggestions were used to make final revisions on the instrument. Specific directions for administration of this interview schedule can be found in Appendix D.

Operational Definitions

In this study, children's nutrition-related interests were defined as rankings of nutrition concepts considered "most important" and "least important" on the CINEC (see Appendix D). Children's nutrition-related knowledge, attitudes, and practices were measured by their

Table 2

Reliability Correlations for Q-Sort Items

Item	Description	Reliability
Q1	Food for people of different ages	.55
Q2	Food and growth needs	.40
Q3	Kinds of nutrients	.76
Q4	Nutrients in foods	.85
Q5	Health and food choices	.46
Q6	Diets	.17
Q7	Cooking	.22
Q8	Foods that need to be cooked; foods that need to be refrigerated	.04
Q9	Simple meals	.67
Q10	Energy and nutrients	.93
Q11	How foods looks and tastes	.85
Q12	Food from different cultures	.58
Q13	What other people tell us about food	.83
Q14	Change and how we feel about food	.11
Q15	Choosing which foods to eat	.06
Q16	How food gets to us	.88
Q17	World food problems	.83
Q18	How resources are used to solve food problems	.56
Q19	Ways to solve food problems	.50
Q20	How to learn about nutrition	.82

Notes: $N = 10.$

$$r_{tt} = 1 - \frac{V_e}{V_t}, \text{ where}$$

V_t = variance of rankings on first Q-sort trial and

V_e = variance of difference in rankings on first and second Q-sort trials.

scores on Form 8 of the CANKAP (see Appendix B). "High" scores were those above the median; "low" scores were those below the median.

Data Reduction and Analysis

Data generated by the instruments used in this study were analyzed in various ways. Qualitative as well as quantitative procedures were used.

Quantitative Analysis

Rank scores for Q-sort items (i.e., picture concept cards Q1-Q20); median scores for Q-sort items in each of the four goals (G1-GIV); median scores for Q-sort items representing nutrition concepts designed as third-grade level by nutrition education curriculum specialists (GRD3) and for Q-sort items representing nutrition concepts not on third-grade level (GRD3NOT); and demographic information (i.e., gender, school setting, school code, instrument code, and ID number) were entered on a computer card for each child. This information was analyzed in several different ways.

To test hypothesis 1, a correlation matrix for rankings of the 20 Q-sort items and scores from tests of nutrition-related knowledge, attitudes, and practices (CANKAP) was created using Spearman's rho. For hypothesis 2, a t test was used to test the following: median GRD3-median GRD3NOT = 0. For hypothesis 3, a Wilcoxon rank-sum procedure was used. An equality of variances test for matched samples was used for hypothesis 4. To test hypotheses 5 and 6, Wilcoxon rank-sum tests were performed. The criterion for significance with statistical tests was a probability level of .10.

Qualitative Analysis

Content analysis was used to analyze responses given by children on sections 1, 3, and 5 of the CINEC. Information was categorized according to general similarities in responses; the number of responses in each category was tabulated. Independent analysis also was conducted by a doctoral candidate with a background in child development and nutrition education. Consensus was reached after several joint work sessions.

CHAPTER IV

RESULTS

Results of this study reflect two general types of procedures used in data analysis. Data generated from tests of nutrition-related knowledge, attitudes, and practices (CANKAP) and interviews about nutrition interests (CINEC) were analyzed quantitatively and qualitatively.

Quantitative Analysis

As shown from results of Spearman's rho correlation procedure (see Table 3), there was no correlation between children's nutrition-related practices and their nutrition interests. However, there were correlations between interests and both knowledge and attitudes. There were negative correlations between knowledge and the concept "what other people tell us about food" and knowledge and the goal "understand the relationship between individual and environmental characteristics and food-related behavior." There was a positive correlation between knowledge and the goal "understand the relationship of nutrition to health." There were negative correlations between attitudes and the concepts "food for people of different ages" and "change and how we feel about food." There was a positive correlation between attitudes and the goal "understand the relationship between individual and environmental characteristics and food-related behavior."

Table 3

Spearman's Rho Correlations Between Nutrition Interests and Nutrition-Related Knowledge, Attitudes, and Practices

Item	Description	Knowledge ρ	Knowledge p	Attitudes ρ	Attitudes p	Practices ρ	Practices p
	Nutrition concepts						
Q1	Food for people of different ages	.14	.29	-.22	.08	-.04	.74
Q2	Food and growth needs	.05	.66	-.09	.49	-.04	.73
Q3	Kinds of nutrients	.10	.41	-.03	.79	.14	.28
Q4	Nutrients in foods	.07	.60	.15	.22	.04	.76
Q5	Health and food choices	.08	.54	.02	.89	-.08	.53
Q6	Diets	.12	.34	-.07	.59	-.08	.55
Q7	Cooking	-.07	.61	.13	.30	-.13	.31
Q8	Foods that need to be cooked; foods that need to be refrigerated	.04	.75	-.18	.16	-.19	.14
Q9	Simple meals	-.16	.21	-.05	.68	-.03	.83
Q10	Energy and nutrients	-.09	.48	-.10	.45	.04	.73
Q11	How food looks and tastes	-.09	.49	.27	.03	-.08	.53
Q12	Food from different children	-.20	.12	.02	.88	.05	.69
Q13	What other people tell us about food	-.22	.08	.04	.77	-.10	.42
Q14	Change and how we feel about food	.01	.94	-.22	.08	-.04	.78
Q15	Choosing which foods to eat	.14	.28	-.04	.74	.19	.14
Q16	How food gets to us	-.04	.75	.19	.14	.12	.36
Q17	World food problems	.09	.46	.15	.24	.19	.13

Table 3 (continued)

Item	Description	Knowledge		Attitudes		Practices	
		ρ	p	ρ	p	ρ	p
Q18	How resources are used to solve food problems	.01	.94	.10	.43	.03	.81
Q19	Ways to solve food problems	.06	.61	-.01	.97	.01	.94
Q20	How to learn about nutrition	.002	.99	.03	.80	.06	.65
	Nutrition goals						
GI	Understand the relationship of nutrition to health	.21	.10	-.002	.99	-.09	.46
GII	Understand the relationship between individual and environmental characteristics and food-related behavior	-.27	.03	.27	.03	.13	.32
GIII	Understand the physical and chemical properties of food	-.19	.13	-.08	.53	-.18	.16
GIV	Understand the process for resolving food- and nutrition-related concerns	.06	.62	-.09	.47	-.03	.84

Note. N = 63.

As shown in results of the t test, there were differences between children's interest in nutrition concepts considered important for third-graders by nutrition education specialists and their interest in those concepts not designated by the specialists as important for third-graders, $t(61) = 3.37$, $p < .001$). The mean for concepts designated as third-grade level (GRD3) was 4.68, with a standard deviation of .56; the mean for concepts not on a third-grade level (GRD3NOT) was 4.12, with a standard deviation of .85. Distribution of concepts by goal and grade level is shown in Appendix C.

As shown from results of Wilcoxon rank-sum tests, children with high scores on tests of nutrition-related knowledge, attitudes, and practices (CANKAP) were not more interested in nutrition concepts considered important for third-graders than were children with lower scores. There were no differences based on knowledge, $F(1) = .38$, $p < .54$; attitudes, $F(1) = .63$; $p < .43$; or practices, $F(1) = .03$, $p < .86$.

As shown in results of the test for equality of variances on matched samples, there was disagreement among children within goals, $\chi^2(3) = 5.24$, $p < .15$. Mean and median scores were higher for Goal I than for the other goals. The range of scores was greatest for Goal II (see Table 4).

As shown from results of a Wilcoxon rank-sum test, there were differences in nutrition-related interests of girls and boys (see Table 5). There were differences in ranking of the following nutrition concepts and goals: (a) girls ranked the concept "food for people of different ages" higher than did boys, (b) boys ranked "how food gets

Table 4

Student Agreement within Nutrition Goals

Goal	Description	M	SD	Median	Minimum	Maximum
GI	Understand the relationship of nutrition to health	5.04	.66	5.00	3.00	6.50
GII	Understand the relationship between individual and environmental characteristics and food-related behavior	4.12	1.08	4.00	2.00	7.00
GIII	Understand the physical and chemical properties of food	4.13	.94	4.00	2.00	6.00
GIV	Understand the nature and means of resolving food- and nutrition-related concerns	4.32	.93	4.00	3.00	7.00

Note. N = 63.

Table 5

Wilcoxon Rank-Sum Test of Nutrition Interests by the Children's Gender

Item	Description	M	MS	MS_e	F	p
	Nutrition concepts					
Q1	Food for people of different ages					
	Girls	5.00	16.68	3.10	5.39	.02
	Boys	3.96				
Q2	Food and growth needs					
	Girls	4.97	2.49	1.48	1.69	.20
	Boys	4.57				
Q3	Kinds of nutrients					
	Girls	5.11	.10	1.81	.05	.82
	Boys	5.04				
Q4	Nutrients in foods					
	Girls	5.80	.15	2.12	.54	.46
	Boys	6.07				
Q5	Health and food choices					
	Girls	5.69	5.21	2.30	2.27	.14
	Boys	5.11				
Q6	Diets					
	Girls	4.57	1.27	3.51	.36	.55
	Boys	4.29				
Q7	Cooking					
	Girls	3.46	.92	2.71	.34	.56
	Boys	3.21				
Q8	Foods that need to be cooked; foods that need to be refrigerated					
	Girls	5.05	3.15	3.16	1.00	.32
	Boys	4.61				
Q9	Simple meals					
	Girls	3.46	2.06	3.32	.62	.43
	Boys	3.82				
Q10	Energy and nutrients					
	Girls	4.80	7.62	2.76	2.76	.10
	Boys	5.50				
Q11	How food looks and tastes					
	Girls	3.91	8.26	4.67	1.77	.19
	Boys	4.64				

Table 5 (continued)

Item	Description	M	MS	MS_e	F	p
Q12	Food from different cultures					
	Girls	3.83				
	Boys	3.68	.35	1.72	.20	.65
Q13	What other people tell us about food					
	Girls	3.14				
	Boys	3.50	1.98	2.64	.75	.39
Q14	Change and how we feel about food					
	Girls	3.29				
	Boys	3.39	.18	2.09	.09	.77
Q15	Choosing which foods to eat					
	Girls	5.06				
	Boys	4.50	4.83	5.06	.95	.33
Q16	How food gets to us					
	Girls	4.23				
	Boys	5.14	13.00	3.50	3.71	.05
Q17	World food problems					
	Girls	4.77				
	Boys	5.21	3.05	3.00	1.02	.32
Q18	How resources are used to solve food problems					
	Girls	4.20				
	Boys	4.36	.38	2.50	.15	.70
Q19	Ways to solve food problems					
	Girls	4.51				
	Boys	4.43	.11	1.86	.06	.81
Q20	How to learn about nutrition					
	Girls	4.94				
	Boys	4.86	.11	2.48	.05	.83
	Nutrition goals					
GI	Understand the relationship of nutrition to health					
	Girls	5.27				
	Boys	4.67	5.60	.65	8.54	.004

Table 5 (continued)

Item	Description	M	MS	MS_e	F	p
GII	Understand the relationship between individual and environmental characteristics and food-related behavior					
	Girls	3.73	7.31	1.20	6.08	.02
	Boys	4.41				
GIII	Understand the physical and chemical properties of food					
	Girls	4.11	.15	1.12	.14	.71
	Boys	4.01				
GIV	Understand the nature and means of resolving food- and nutrition-related concerns					
	Girls	4.27	.02	1.10	.02	.88
	Boys	4.23				

Note. N = 35 girls and 28 boys.

to us" higher than did girls, (c) boys also ranked "energy and nutrients" higher than did girls, (d) girls ranked nutrition concepts in Goal I ("understanding the relationship of nutrition to health") higher than did boys, and (e) boys ranked concepts in Goal II ("understand the relationship between individual and environmental characteristics and food-related behavior") higher than did girls.

Also, as shown by results of Wilcoxon rank-sum tests, there were differences in nutrition concepts and goals considered important by children in rural schools and those in urban schools (see Table 6). There were rural/urban differences in ranking of the following nutrition concept and goal areas: (a) children attending rural schools ranked the concept "energy and nutrients" higher than did children attending urban schools, (b) children attending rural schools also ranked "food from different cultures" higher than did those attending urban schools, (c) children from urban schools ranked "change and how we feel about food" higher than did rural school children, and (d) children attending rural schools ranked Goal II ("understand the relationship between individual and environmental characteristics and food-related behavior") higher than did children attending urban schools.

Qualitative Analysis

Children's definitions of nutrition seemed to fall into several general categories (see Table 7). Quotations from student responses are helpful in describing these categories. Although only 63 children

Table 6

Wilcoxon Rank-Sum Test of Nutrition Interests
by Children's School Setting

Item	Description	M	MS	MS_e	F	p
	Nutrition concepts					
Q1	Food for people of different ages					
	Rural	4.48	.19	3.36	.06	.81
	Urban	4.59				
Q2	Food and growth needs					
	Rural	4.58	2.77	1.47	1.89	.17
	Urban	5.00				
Q3	Kinds of nutrients					
	Rural	4.97	.76	1.80	.42	.52
	Urban	5.19				
Q4	Nutrients in foods					
	Rural	6.06	1.26	2.12	.60	.44
	Urban	5.78				
Q5	Health and food choices					
	Rural	5.29	1.17	2.36	.49	.48
	Urban	5.56				
Q6	Diets					
	Rural	4.52	.31	3.53	.09	.77
	Urban	4.38				
Q7	Cooking					
	Rural	3.26	.51	2.72	.19	.67
	Urban	3.44				
Q8	Foods that need to be cooked; foods that need to be refrigerated					
	Rural	4.65	2.74	3.16	.87	.35
	Urban	5.06				
Q9	Simple meals					
	Rural	3.77	1.47	3.33	.44	.51
	Urban	3.47				
Q10	Energy and nutrients					
	Rural	5.58	13.45	2.67	5.04	.03
	Urban	4.66				
Q11	How food looks and tastes					
	Rural	4.16	.36	4.80	.07	.78
	Urban	4.31				

Table 6 (continued)

Item	Description	M	MS	MS_e	F	p
Q12	Food from different cultures					
	Rural	4.06				
	Urban	3.47	5.59	1.64	3.41	.06
Q13	What other people tell us about food					
	Rural	3.45				
	Urban	3.16	1.37	2.65	.52	.47
Q14	Change and how we feel about it					
	Rural	3.03				
	Urban	3.63	5.53	2.00	2.76	.10
Q15	Choosing which foods to eat					
	Rural	4.45				
	Urban	5.16	7.82	5.01	1.56	.22
Q16	How food gets to us					
	Rural	4.87				
	Urban	4.41	3.40	3.66	.93	.34
Q17	World food problems					
	Rural	5.03				
	Urban	4.91	.25	3.04	.08	.77
Q18	How resources are used to solve food problems					
	Rural	4.19				
	Urban	4.34	.35	2.49	.14	.71
Q19	Ways to solve food problems					
	Rural	4.58				
	Urban	4.38	.66	1.85	.36	.55
Q20	How to learn about nutrition					
	Rural	4.68				
	Urban	5.13	3.15	2.43	1.30	.26
	Nutrition goals					
G1	Understand the relationship of nutrition to health					
	Rural	5.00				
	Urban	5.01	.0013	.75	.00	.96

Table 6 (continued)

Item	Description	M	MS	MS_e	F	p
GII	Understand the relationship between individual and environmental characteristics and food-related behavior					
	Rural	4.35	6.31	1.22	5.17	.03
	Urban	3.72				
GIII	Understand the physical and chemical properties of food					
	Rural	4.18	.71	1.11	.63	.43
	Urban	3.97				
GIV	Understand the nature and means of resolving food- and nutrition-related concerns					
	Rural	4.18	.36	1.09	.33	.57
	Urban	4.33				

Note. N = 31 rural children and 32 urban children.

Table 7

Children's Definitions of Nutrition

Category	Description	Number of student responses
1	Foods and types of foods ("diet foods" and "fruits and vegetables")	10
2	Foods that are beneficial ("healthy," "in the four good groups")	25
3	Food constituents ("vitamins and minerals," "nutrients, calcium," "iron," "vitamins and calories")	7
4	Food choices (foods categorized into "good for you," or "some food has nutrition, some doesn't")	13
5	Properties of food for the body ("something we get energy from," "gives us healthy bones," "helps us grow")	11
6	Quantities and proportions of food ("people aren't supposed to eat all that much," "cut down on sweets, eat more vegetables")	2
7	Cultural aspects of food ("when we eat," "tasty foods")	3
8	Food and its relation to dental health ("cleaning your teeth")	1
9	No information ("I don't know," "I can't think of anything")	6

Notes. Responses were to the instruction, "Tell me what nutrition is."

N = 63 children; total number of responses = 80.

were interviewed for this study, there was a total of 80 responses to the item "Tell me what nutrition is"; several definitions included material that fell into more than one response category. For example, the definition "food--vitamins and they're healthy for you" was counted under response categories 1 ("different kinds of food"), 2 ("foods that are beneficial"), and 3 ("food constituents"). Definition most children gave fell under the following categories: 2 ("foods that are beneficial"), 4 ("food choices"), and 5 ("properties of food for the body").

Categories of ideas given by children concerning what they think it would be good to talk about if they were the producers of a television show about nutrition for students their age are shown in Table 8. More children said they thought it would be good to talk about "foods that are beneficial," "properties of food for the body," and "food choices." Here again, in some instances, comments were counted under several different response categories.

Children's rankings of nutrition concepts they considered the most important are shown in Table 9. "Nutrients in foods" was considered "most important" by more children than any other concept; the concepts "cooking" and "food from different cultures" were not chosen as "most important" by any children. Examples of children's reasons for choosing concepts as "most important" appear in Appendix E.

Table 8

Children's Perceptions of Nutrition Interests of Other Third-Grade Students

Category	Description	Number of student responses
1	Foods--different kinds of food ("fruit and vegetable show," "fruit game")	10
2	Foods that are beneficial ("foods that are good for you to eat," "diet foods, fruits and vegetables, and things that are good for you," "nutritional food," "nutrition; energy foods")	23
3	Food constituents ("milk--it is nutritious--has vitamins, protein, and calories," "vitamins and stuff; calories")	11
4	Food choices (foods categorized into "foods to eat" and "what not to eat")	15
5	Properties of food for the body ("things to make your body grow," "vegetables--they give you strength")	19
6	Quantities and proportions of food ("diets--what you could eat if you wanted to gain or lose weight," "not eating sweets in between meals")	3
7	Health--including dental health and exercise ("keeping your teeth healthy," "how if you don't exercise, you'll get weak and won't be able to run!")	5
8	Cultural aspects of food, food tastes and preferences--trying new foods ("what's your favorite foods and stuff like that, tell little kids how good foods taste," "how you eat")	6
9	Food preparation, storage, and production ("refrigerate stuff so it won't spoil," "don't put too much stuff--like salad dressing--on food," "how to grow your own")	5
10	Food problems and food conservation ("nutrients--how you can get it to other people who need it," "not to use it [food] too quickly or you'll run out of it")	6
11	No information ("I don't know")	

Notes. Responses were to the instruction "Now let's pretend you are the producer of a television show about nutrition for children your age. What do you think would be good to talk about on the show?"

N = 63 children; total number of responses = 104.

Table 9

Children's Rankings of Nutrition Concepts They Considered the Most Important

Category	Description	Number of students selecting concept as most important	Weighted value of ranking
Q4	Nutrients in foods	12	96
Q15	Choosing which foods to eat	8	64
Q11	How food looks and tastes	6	48
Q17	World food problems	6	48
Q5	Health and food choices	6	48
Q10	Energy and nutrients	4	32
Q1	Food for people of different ages	3	24
Q3	Kinds of nutrients	3	24
Q8	Foods that need to be cooked; foods that need to be refrigerated	3	24
Q6	Diets	2	16
Q16	How food gets to us	2	16
Q18	How resources are used to solve food problems	2	16
Q19	Ways to solve food problems	1	8
Q14	Change and how we feel about food	1	8
Q20	How to learn about nutrition	1	8
Q2	Food and growth needs	1	8
Q13	What other people tell us about food	1	8
Q9	Simple meals	1	8
Q7	Cooking	0	0
Q12	Food from different cultures	0	0

Note. Scale = 1-8, with 1 = least important and 8 = most important; weighted value of ranking = 8 x number of students selecting concept as most important.

CHAPTER V

DISCUSSION

Both quantitative and qualitative analyses were conducted using data from tests of nutrition-related knowledge, attitudes, and practices (CANKAP) and interviews about nutrition interests (CINEC). Conclusions drawn from the quantitative analysis is generally more consistent with other research findings concerning relationships among nutrition-related knowledge, attitudes, and practices as well as gender and rural/urban differences. Children's assessment of the relative importance of nutrition concepts and nutrition education goals was consistent with that of nutrition education specialists. Conclusions drawn from the qualitative analysis were consistent with findings of other researchers concerning the nature of responses given by primary school children.

Treatment of Hypotheses

As shown in the analysis of the data, there were relationships between children's nutrition-related interests and their nutrition-related knowledge and between children's interests and attitudes. However, there was no relationship between children's nutrition-related interests and their practices. Therefore, the first null hypothesis was rejected and there was some support for the substantive hypothesis that there are relationships between children's nutrition-related interests and their nutrition-related knowledge, attitudes, and practices.

There was a difference in children's interests in concepts designated by nutrition education specialists as appropriate for grade 3 versus those nutrition concepts designated for other grade levels; the children in this study ranked "grade 3" concepts higher than "other grade level" concepts. Therefore, the second null hypothesis was accepted. There was no support for the substantive hypothesis that there was a difference between nutrition concepts considered important by nutrition education curriculum specialists and nutrition concepts considered important by primary school students. In essence, the students agreed with the specialists.

There was no difference in agreement with nutrition education specialists between students with high scores on tests of nutrition-related knowledge, attitudes, and practices and those with lower scores. Therefore, the third null hypothesis was accepted. There was no support for the substantive hypothesis that children with higher scores on tests of nutrition-related knowledge, attitudes, and practices had more interest in nutrition concepts considered important by nutrition education curriculum specialists than did children with lower scores.

Children's rankings of nutrition concepts pertaining to Goal II ("understand the relationship between individual and environmental characteristics and food-related behavior") in the goals and objectives framework for grades K-12 (Skinner et al., 1980) were not consistent. Therefore, the fourth null hypothesis was accepted. There was no support for the substantive hypothesis that there was agreement among

children concerning the importance of nutrition education curriculum goals.

There were differences in nutrition-related interests of boys and girls. Therefore, the fifth null hypothesis was rejected; there was support for the substantive hypothesis that there were gender differences in children's nutrition-related interests.

The sixth null hypothesis also was rejected. There was support for the substantive hypothesis that there were differences in nutrition-related interests of children attending rural schools and those in urban school settings.

Discussion

Conclusions of this study are relevant to several different topics. These include (a) children's nutrition interests in relation to their knowledge, attitudes, and practices; (b) children's interest in nutrition education goals; (c) children's agreement with nutrition education specialists concerning the importance of nutrition concepts; (d) children's nutrition interests and gender differences; (e) children's nutrition interests and differences in school settings; and (f) children's ideas about nutrition and nutrition education.

Children's Nutrition Interests in Relation to Their Knowledge, Attitudes, and Practices

Although there was no relationship between children's interests and their practices, there were relationships between children's nutrition interests and nutrition-related knowledge and attitudes.

In view of research findings concerning children's attitudes in relation to reading (i.e., that interest in reading material enhances reading skills) (Christie & Schumacher, 1975; Zivin, 1974), it seems logical to conclude that a relationship between children's interests and attitudes might exist. Further, there may be a relationship between attitudes and knowledge (Sims, 1976). However, the fact that there were both inverse and direct relationships among interests and knowledge and attitudes seems consistent with the inconclusiveness of other research concerning relationships among knowledge, attitudes, and practices. Attitudes may be important in translating nutrition-related knowledge into practice; however, any relationships found to exist among these variables are considered tenuous (Sims, 1981).

Children's Interest in Nutrition Education Goals

Children ranked Goal I ("understand the relationship of nutrition to health") highest in importance. This seems consistent with children's definitions of nutrition and their ideas concerning what would be good to include on a television show about nutrition for students their age. The largest number of student responses seemed to fall into the following categories: (a) "foods that are beneficial," (b) "properties of food for the body," and (c) "food choices. These categories could be classified under the goal "understand the relationship of nutrition to health." This goal was ranked as highest priority for this age level by nutrition education specialists (Cunningham et al., 1981). Further, children's nutrition-related

knowledge was related directly to their interest in Goal I. However, children's interest in one of the concepts associated with Goal I (i.e., "food for people of different ages") was related inversely to their nutrition-related attitudes. Possibly children considered this concept so obvious it did not need to be discussed; when asked why they selected it as the least important concept, several children said "everybody knows that" and "the baby [in the picture] won't always eat different food."

The range of scores was greatest for Goal II ("understand the relationship between individual and environmental characteristics and food-related behavior"). This variation is consistent with the fact that interest in Goal II was related directly to attitudes and related inversely to knowledge.

Even though children's nutrition-related attitudes were related directly to their interest in Goal II, the relationship between their attitudes and the Goal II concept "change and how we feel about food" was inverse. This inconsistency may be related to the fact that the attitude scale on the CANKAP was not as reliable as the knowledge scale.

Subject matter associated with Goal II is less likely to be included in most nutrition education programs than is subject matter associated with Goal I, which includes more traditional types of nutrition concepts. Perhaps lack of knowledge of these concepts affected children's understanding of the full meaning of these concepts and, therefore, their interest in them. For example, interest in one Goal II concept (i.e., "what other people tell us about food")

was related inversely to knowledge. Lack of understanding of this concept is reflected in the differences in reasons children gave for choosing the concept as "least important" (e.g., "it doesn't really matter what other people say," "you don't know what it tastes like until you try it," and "if you take other people's advice and go and buy [something] and don't like it, you might get sick and throw up").

Children's Agreement with Nutrition Education Specialists Concerning the Importance of Nutrition Concepts

There was no difference in agreement with nutrition education specialists concerning the relative importance of nutrition education "grade 3" concepts between students with high scores on tests of nutrition-related knowledge, attitudes, and practices and those with lower scores. This finding is consistent with other results of this study. For example, relationships between nutrition-related knowledge and interests and nutrition-related attitudes and interests were inconsistent. Further, children in general (regardless of their scores on tests of nutrition-related knowledge, attitudes, and practices) agreed with nutrition education specialists concerning the relative importance of "grade 3" nutrition concepts.

Children's Nutrition Interests and Gender Differences

Boys in this study ranked Goal II as well as a concept included in this goal (i.e., "how food gets to us") higher than did girls. Girls in the study ranked Goal I and one Goal I concept ("food for people of different ages") higher than did the boys. These findings

seem consistent with findings of other researchers concerning gender differences in cognitive style (Harter, 1975; Maccoby & Jacklin, 1974). Perhaps differences in this study can be attributed to the fact that females traditionally have been concerned with caring for people, whereas males have dealt more with environmental or technical concerns than with human needs. The fact that boys ranked the concept "energy and nutrients" higher than did the girls may have had more to do with the picture representing this concept rather than the idea behind the concept itself. The Q-sort card included a picture of a young man pedalling vigorously on an exercise bicycle. This picture may have held stronger appeal for third-grade boys than for third-grade girls.

Children's Nutrition Interests and Differences in School Settings

Both boys and girls attending rural schools ranked the "energy and nutrients" concept higher than did children in urban schools. It may be that children in rural areas use their bodies more than urban children and, therefore, are more conscious of them; they may be more concerned with exercise or simply enough energy to work and play in a rural setting. Rural children also ranked Goal II ("understand the relationship between individual and environmental characteristics and food-related behavior") higher than did urban children. Because rural children often are closer to food production and distribution. They may recognize more readily the importance of such concepts as "how food gets to us" and "how food looks and tastes." On the other hand, familiarity with activities related to a concept may not necessarily be a criterion for giving that concept a high

rank. For example, urban children logically may be more familiar with the idea of "food from different cultures," yet rural children ranked this concept higher than did urban children. "Change and how we feel about food" was the only concept urban children ranked higher than rural children. This may be because urban children are more accustomed to change and a faster paced life. These findings seem consistent with research concerning rural versus urban differences in food-related behavior (e.g., Walker et al., 1973).

Children's Ideas About Nutrition and Nutrition Education

In the qualitative analysis of data in this study, the number of categories as well as the total number of responses was greater for the question about producing a children's television program about nutrition than the one about defining or describing nutrition. The use of a hypothetical situation (i.e., asking children to pretend they were producing a television show about nutrition for students their age) may have been more effective in eliciting responses from third-graders than merely asking for a definition. Further, the fact that children were shown the Q-sort cards while explanations were given for these concepts (see Appendix D) before presentig the hypothetical question was presented also may help account for the greater number of responses as well as higher sophistication of these responses. Further, there were wide variations in sophistication of responses among individual children participating in the study. For example, when asked why they thought it was important to study about nutrients, children's answers varied from "it's kind

of hard to understand about nutrition; like some of those big, old long words--kids don't know what they mean," to "you need protein, water, fats 'cause they're good for you and you need to eat at least one of them every day."

Contento (1981) also found wide variations in the level of sophistication of children's responses to nutrition-related questions. In fact, there are several parallels between the present study and Contento's work:

1. Children in this study seemed to view vitamins in much the same manner as those interviewed by Contento; they talked about vitamins but did not seem to understand the relationship between food and vitamins. For example, they talked about how vegetables, vitamins, and fruit make you grow.

2. In both studies, children talked about protein, minerals, and fats but did not seem to understand the relationship between these nutrients and bodily functions. For example, in the present study, one child said, "if you just take food and gulp it down, it don't [sic] give you much energy."

3. Children in both studies used such phrases as "good for you" or "bad for you," "healthy," and "makes you grow and makes you strong" when referring to food and nutrition. For example, in the present study, one child defined nutrition as "good foods; it's good for your health." Findings concerning the sophistication of children's responses both in Contento's study and in the present study are consistent with conclusions drawn by Piaget (1970) concerning children's responses to adults' questions (i.e., children sometimes express

words such as vitamins and minerals without actually understanding the concepts behind them).

Limitations of the Study

Results of this study probably were influenced by certain factors present because of the methodology used in the study. These factors include the sampling process used in the study, instrument reliability, and intervening variables such as school atmosphere and the ability of children to relate to the researcher and communicate in connection with open-ended questions asked during the interviews.

Subject selection for this study was nonrandom; the sampling process used may have affected the results. Schools for this study were selected from the stratified sample identified for the assessment phase of the Tennessee Nutrition Education and Training Program evaluation project on the basis of their location in East Tennessee; this selection procedure introduced a cultural bias that may have influenced rankings in nutrition-related interests in general and urban/rural differences in particular.

Another selection bias may have affected the results of the study as well. Subjects who had returned their permission slips by an arbitrary date may have been different in terms of family background, motivation, and perceptions of nutrition than those who did not return their forms.

There is another limitation of the study with regard to instrument reliability. Responses for knowledge items or CANKAP were fairly stable. However, responses for attitudes and practices items were not

as consistent. This may have affected results of the Spearman's rho correlations, especially correlations between interests and attitudes and interests and practices. Further, although instrument reliability for the CINEC was .86, there was wide variation in consistency of student responses to individual Q-sort items (see Table 2, p. 47).

There also seem to be some questions about instrument validity. Problems appeared mainly in connection with pictures composing the Q-sort concept cards. In some instances, children seemed to be focusing on pictures representing the concept rather than on the concept itself. This was evident from some of their responses to questions concerning why they had chosen a particular concept card as "most important" or "least important." For example, several children said they considered "food from different cultures" the least important concept because they did not like the raw fish in the picture representing the concept. Other children said they considered "health and food choices" more important than "choosing which foods to eat" because the pie in the pictures representing "choosing which foods to eat" was "not good for you," whereas foods in "health and food choices" were "good for you."

Lastly, responses to open-ended questions during the interviews may have been governed to some extent by each child's ability to communicate and relate to the researcher as well as school atmosphere. Some students were very talkative when answering interview questions; others seemed shy and unwilling to divulge information. Also, there were wide variations in the atmosphere of schools selected to participate in the study. In some schools, it was easy to obtain cooperation from students and elicit their responses; in other schools, there was

a reticence on the part of students and teachers alike that was difficult to overcome. Intervening variables such as these may have affected both the quantity and quality of student responses to open-ended questions.

Implications of the Study

Conclusions from this study have implications in at least three different areas: (a) nutrition education, (b) educational curriculum development/evaluation, and (c) cognitive development. These conclusions have theoretical implications as well as implications for further research.

Nutrition Education

Knowledge of young children's interests may be helpful in making nutrition education programs more relevant and more effective. For example, it would be valuable to know that some children already understood the concept "food for people of different ages" and felt they did not need to study about it. Knowledge of gender and rural versus urban differences also might be valuable. Nutrition educators may need to gear their programs toward the interests of their clientele but at the same time attempt to interest them in other concepts as well. For example, in urban areas it would seem logical to focus on such concepts as "change and how we feel about food" but still try to bring in aspects of food production and distribution. Further, nutrition educators may need to work harder to interest boys in "food for people of different ages" and girls in "energy and nutrients."

Conclusions from this study concerning children's perceptions of such abstract concepts as vitamins and minerals may be particularly valuable to nutrition educators. For example, if primary school children do not understand fully the meaning of vitamins and minerals or comprehend the process of digestion, it seems futile to include such topics as "absorption of nutrients" in the curriculum. More research needs to be done concerning children's thought processes, especially in connection with abstract concepts in subjects such as nutrition.

Further, it seems significant that children in this study agreed with the nutrition education specialists concerning the importance of nutrition concepts. This conclusion seems to underline the importance of employing a team of specialists with expertise in areas of human development and curriculum development/evaluation as well as nutrition and food science to develop a nutrition education curriculum. However, it seems that even a competent team of specialists with an interdisciplinary focus would find information concerning children's nutrition interests valuable. These ideas, when appropriate, could be integrated into the framework of goals and objectives to make the curriculum more relevant for other children their age.

Educational Curriculum Development/Evaluation

One of the assumptions on which this study was based was related to young children's ability to identify aspects of curriculum content material interesting and/or important to them. Although there was a wide variation in the sophistication of responses concerning why

children considered a particular concept more important than others, they did not seem to experience difficulty in classifying concepts presented as pictures as "most important" or "least important." A Q-sort seems to be a fairly realistic method of obtaining this type of information from children. An important aspect of curriculum development/evaluation is gathering system feedback information from clientele (Hammond, 1969; Stake, 1967). An interview strategy such as the one used in this study could be used to obtain this type of feedback in a relatively short period of time (approximately 20 minutes) in an informal yet in-depth manner.

Feedback information from young children could serve the curriculum development/evaluation system in several capacities. To begin with, this information could provide valuable feedback during goal formulation and reformulation phases of curriculum development/evaluation. Further, information from children concerning concepts they think are important could be used to evaluate goal and objective frameworks developed by curriculum specialists as was done in this study. As shown in the findings of the study, there was student agreement with nutrition concepts considered important for third-grade level by nutrition education specialists. If disagreement had occurred, however, student input could have been used to evaluate further Tennessee's NET framework of goals and objectives.

Cognitive Development

Middle childhood is associated with the development of concrete operations (Piaget, 1968). Attainment of concrete operations seems

to be related to other aspects of concrete operations (Nelson, 1974), such as the increased ability to organize perceptions according to logical processes (Lasky, 1974; Smith, 1979) and increased verbal communication skills (Bereiter, Hide, & Dimitroff, 1979; Ironsmith & Whitehurst, 1978; Olson, 1975). However, attainment of concrete operations does not seem to guarantee accurate organization and communication of perceptions (Contento, 1981). Further, conclusions from the present study as well as from Contento's study seem to support Piaget's (1970) conclusions that children sometimes express words without fully understanding the concepts behind them.

More research is needed concerning cognitive development during middle childhood. Conclusions from the present study seem to generate more research questions than they answer. For example, the Q-sort method on which the interview schedule (CINEC) was based did seem to be a viable technique for obtaining information from young children concerning their interests. Could Q-sorts be used in obtaining other types of relatively abstract information from children? If so, what types, configurations, and/or combinations of pictures produce the most reliable results? How many items can young children manipulate?

Further, what about attitudes of young children? How can they be measured? Attitudes may be an important key to everything from food behavior to reading success. More research in attitude measurement needs to be done, especially with young children.

We are in the midst of an information explosion. How does this affect young children? What is their intellectual potential? Children

may have more potential for thinking about abstract ideas than has been demonstrated previously (Christie & Schumacher, 1975). According to Bruner (1956), any child can be taught something intellectually respectable about any subject at any age if it is presented in a developmentally appropriate manner. This is a challenge to find out more about cognitive development and what is developmentally appropriate in nutrition as well as in other subject areas.

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APPENDICES

APPENDIX A

COMMUNICATIONS TO PARENTS

THE UNIVERSITY OF TENNESSEE
COLLEGE OF EDUCATION
KNOXVILLE, TENNESSEE 37916

BUREAU OF EDUCATIONAL RESEARCH AND SERVICE

Dear Parent:

As coordinator of the Tennessee Nutrition Education and Training Program (NET) evaluation project, I would like to gather additional information concerning the effectiveness of NET. Your child will be interviewed to determine what nutrition concepts he/she considers important. The interview will be conducted during the regular school day on the school premises; it will last no longer than 20 minutes. Your child's responses during the interview will remain confidential at all times. A special code will be used to identify interview responses. Your child's name will not be revealed to anyone throughout the study.

Thank you for your help in this endeavor.

Sincerely,

Margaret McCabe

Margaret McCabe
Coordinator Tennessee NET Evaluation

Parents' Informed Consent

I understand the following:

1. Through his/her enrollment in the public schools, my child has an opportunity to participate in an evaluation project of the Tennessee Nutrition Education and Training Program.

2. No direct effects, positive or negative, are anticipated for my child from his/her participation in the project. However, my child's participation may be helpful to educators developing nutrition education programs.

3. My child's participation will involve his/her being interviewed to determine what nutrition concepts he/she considers important. Less than 20 minutes will be required for the interview.

4. I can stop my child's participation in the project at any time. Such withdrawal from participation will not result in any penalty or prejudice to me or my child.

5. Additional information regarding this project may be obtained by contacting Ms. Margaret McCabe, Coordinator NET Evaluation, Bureau of Educational Research and Service, 4026 Terrace Avenue, The University of Tennessee, Knoxville, Tennessee 37916.

I, _____, freely consent for my child to participate in the project under the conditions stated above.

Signed_____

Date_____

APPENDIX B

COMPREHENSIVE ASSESSMENT OF NUTRITION KNOWLEDGE, ATTITUDES, AND PRACTICES

THE UNIVERSITY OF TENNESSEE
COLLEGE OF EDUCATION
KNOXVILLE, TENNESSEE 37916

BUREAU OF EDUCATIONAL RESEARCH AND SERVICE

Dear Student:

We are very happy that your school has agreed to let us study what you, your teachers, the principal, and the food service workers know and think about nutrition. Your answers on this questionnaire will help us know what to teach about nutrition in school, and what the adults in your school need to know about nutrition to help you learn. You will be helping us evaluate the Tennessee Nutrition Education and Training Program (NET). The main goal of NET is to help Tennessee's children and youth to understand the relationship of food and nutrition to total health, and to use this knowledge to select a nutritious diet.

Please answer the questions on this questionnaire for students. Do not write your name on the questionnaire - we will not let anyone know what your responses were. All the answers of students in your grade will be put together so we can see what a student about your age knows and thinks about nutrition.

If you complete this questionnaire and return it to your teacher, that will show that you are willing to let us use your answers in this study. You do have the right to not complete the questionnaire, or to stop working on it if you decide later you do not wish to help on the study, without any bad feelings from us or your teacher.

Thank you for your time. We will be very interested in seeing what you know and think about nutrition!

Sincerely,

/S/ Trudy W. Banta
NET Evaluation Director

SECTION I

Directions: For each item in this section (Questions 1-8), mark an "X" through the face at the left of the question which shows how you really feel about that idea. The faces have the following meanings:

1 = I do not like it.

2 = I do not like it or dislike it.

3 = I like it.

1 =  2 =  3 =  (1) How do you feel about the food that is fixed for lunch at your school?

1 =  2 =  3 =  (2) How do you feel about learning about foods that are good for you?

1 =  2 =  3 =  (3) How do you feel about helping decide what food you will have for lunch at your school?

1 =  2 =  3 =  (4) How do you feel about eating green vegetables?

1 =  2 =  3 =  (5) How do you feel about finding out about the kinds of plants and animals from which you get your food?

1 =  2 =  3 =  (6) How do you feel about eating different kinds of food each day?

1 =  2 =  3 =  (7) How do you feel about loud talking while you are eating?

1 =  2 =  3 =  (8) How do you feel about having Coke rather than milk with a meal?

SECTION II

Directions: For each item in this section (Questions 9-17), draw a circle around the word at the left of the question which tells what you really do. Use the following responses:

1 = NO (You usually do not do this.)
2 = YES (You sometimes do this.)

1 = NO 2 = YES	(9) Do you eat the lunch fixed at your school?
1 = NO 2 = YES	(10) Do you help someone at your school decide what will be served for lunch?
1 = NO 2 = YES	(11) Do you learn from your teacher about foods that are good for you?
1 = NO 2 = YES	(12) Do you learn from someone at home about foods that are good for you?
1 = NO 2 = YES	(13) Do you sometimes try a new food you have not eaten before?
1 = NO 2 = YES	(14) Do you ask your parents about whether you should eat the foods you hear about on TV?
1 = NO 2 = YES	(15) Do you eat only the foods that you like most?
1 = NO 2 = YES	(16) Do you eat some foods now that you did not like when you were younger?
1 = NO 2 = YES	(17) Do you ever fix a meal for yourself?

SECTION III

Directions: For each item in this section (Questions 18-37), draw a circle around the number of the best (most correct) answer to the questions.

(18) Which of these foods is made from wheat?

1 = Cheese
2 = Hamburger bun
3 = Peanut butter
4 = Jello

(19) What can we always say about foods that are high in calories?

1 = They cost a lot.
2 = They give us a lot of energy.
3 = They should be eaten with a fork.
4 = They taste good.

(20) Why might a teacher and a grocery store clerk tell you different things about what to eat?

1 = The grocery store clerk probably is more interested in your health.
2 = The grocery store clerk probably knows more about what children eat.
3 = The teacher probably knows more about nutrition.
4 = The teacher probably makes more money.

(21) Which of these foods should be cooked before it is safe to eat?

1 = Cabbage
2 = Egg
3 = Green beans
4 = Spinach

(22) What should you do if you are hungry an hour before supper and have a choice of ice cream and cake or an apple?

1 = It does not matter which you eat because both are good.
2 = You should eat both because they contain different nutrients.
3 = You should eat the apple because the ice cream and cake will make you too full for supper.
4 = You should eat the ice cream and cake because you will be healthier.

(23) How much alike are the foods that healthy people eat?

1 = All healthy people eat meats.
2 = All healthy people eat the same foods.
3 = Different healthy people eat different foods.
4 = Some healthy people eat only breads.

(24) What foods are people most likely to enjoy eating?

1 = Foods from other countries
2 = Foods that do not cost much
3 = Foods they have eaten before
4 = Foods they have tried once

(25) From what animals do we get beef?

1 = Cattle
2 = Chickens
3 = Pigs
4 = Sheep

(26) Why do some people eat foods they did not like when they were younger?

1 = The foods do not cost as much now.
2 = They eat more meals each day.
3 = They have bigger stomachs now.
4 = Their ideas about food have changed.

(27) Which of these is the best reason for eating different kinds of foods?

1 = Different foods are in the grocery store.
2 = Eating different foods costs less.
3 = Eating different foods helps make you healthy.
4 = People in other countries eat different foods.

(28) Which of these mealtime activities would help people enjoy their food the most?

1 = Calling their friends on the phone
2 = Fighting over their food
3 = Playing with their pets
4 = Talking with others at the table

(29) Which of the following foods provides energy but not many nutrients?

1 = Carrot sticks
2 = Celery with cheese
3 = Hamburger
4 = Kool-Aid

(30) If you spill your glass of milk during supper, what would be the best thing to do the next night at supper?

1 = Drink water instead of milk.
2 = Eat ice cream instead of drinking milk.
3 = Eat supper by yourself.
4 = Use a glass that will not turn over as easily.

(31) When do you need to eat the most food?

1 = When the weather is hot
2 = When you are going on a car trip
3 = When you are growing a lot
4 = When you are learning to read

(32) What is the difference in taste between fresh apples and apples in pie?

1 = Apples in pie taste saltier.
2 = Applies in pie taste sweeter.
3 = Apples in pie taste more sour.
4 = Apples in pie taste the same as fresh apples.

(33) In fixing a breakfast of corn flakes, milk, and orange juice, what should you do last?

1 = Get out the dishes.
2 = Pour the corn flakes.
3 = Pour the orange juice.
4 = Put milk on the corn flakes.

(34) What would you need to have to plan a meal?

1 = Courage and strength
2 = Dishes and food
3 = Tablecloth and napkins
4 = Time and skill

(35) Which of these things would be best to tell a friend about how to be healthy?

1 = Eat foods that cost a lot.
2 = Eat the foods you see on TV.
3 = Eat many different kinds of food.
4 = Eat what your friends eat.

(36) If trucks and trains quit working, what would happen to our food?

1 = People still could get the same foods.
2 = People would drive to other states to get their food.
3 = People would grow all the foods they are used to eating.
4 = People would not be able to get as many kinds of foods in the grocery store.

(37) From which of these animals do we get ham?

1 = Cattle
2 = Chickens
3 = Pigs
4 = Sheep

SECTION IV

Directions: Circle the correct answer for each question below.

(cc 38) (1A) What is your sex?

1 = Boy
2 = Girl

(cc 39) (2A) What grade are you in?

2 = Second
3 = Third

Directions: Answer the following question in the space below.

(3A) What changes, if any, would you like to make in the food service program at your school?

		(1) Yes	(2) No
(40)	1. Serve more different kinds of foods.		
(41)	2. Give students more choices (for example, salad bar, different kinds of drinks, different kinds of desserts).		
(42)	3. Serve better tasting food.		
(43)	4. Give bigger servings on the plate.		
(44)	5. Students should be able to help plan meals and ways of doing things in the cafeteria.		
(45)	6. Service should be faster.		
(46)	7. Food prices should be lower.		

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE!

(Do not write below this line.)

(cc 71-73) _____ Code

(cc 74-77) _____ ID

Manual for Administration of the

Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices (CANKAP)

This manual has been prepared for individuals who will be administering any form of the Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices (CANKAP) Instrument. Each form of the test was designed for administration to a specific group as follows:

Form	Group
0	Parents
1	Secondary school teachers
2	Elementary school teachers
3M	Food service managers
3W	Food service workers
4	School administrators
5	Students: Grades 10-12
6	Students: Grades 7-9
7	Students: Grades 4-6
8	Students: Grades 2-3
9	Students: Grades K-1

All forms except 0, 8, and 9 can be used with optical scan (computer-scorable) answer sheets. The forms were designed for use with an NCR General Purpose Answer Sheet (Form F 4521). Forms 0, 8, and 9 were designed for data entry directly from the forms (without intermediate coding).

Form 0--Parents

Form 0 is designed for the respondent to record answers directly on the instrument itself. Directions provided for each section of Form 0 should allow most parents to proceed through the assessment without difficulty.

Forms 1 and 2--Elementary and Secondary Teachers

Forms 1 and 2 require the respondent to record answers to some questions on a separate answer sheet and to record other answers on the instrument itself. Directions for each section should make it possible for respondents to complete the instrument without difficulty.

Forms 3M and 3W--Food Service Workers and Food Service Managers

Forms 3M and 3W require respondents to record some answers on a separate answer sheet and to record others on the instrument itself. Form 3W is the same as Form 3M except the knowledge items have been eliminated.

Form 4--Administrators

Form 4 requires the respondent to record some answers on a separate answer sheet and to record others directly on the instrument. Like Form 3W, Form 4 does not include knowledge items.

Student Forms

The items on each form are geared to the goals and objectives for that level and were written at a reading level appropriate to most students in the grades covered. Some students still will have difficulty with the instruments. If a student asks help with a word, it is appropriate to pronounce the word, but not to define it.

Forms 5, 6, and 7--Students in Grades 10-12, 7-9, and 4-6.

Forms 5, 6, and 7 are designed for the students to record their answers on separate answer sheets. However, for the last question, students are given the option of writing in additional responses.

Form 8--Students in Grades 2-3

Form 8 is designed for students to record their responses directly on the instrument form. Questions and response alternatives are printed on the form, but each item (including the response alternatives) should be read to the students. It is recommended that the examiner observe the students carefully to be sure they understand the procedures and response formats.

Form 9--Students in Kindergarten-Grade 1

Form 9 must be read aloud to the students. It is recommended that each question and response be repeated once. Separate answer sheets (which do not include the questions and response alternatives) are used. It is important that the procedure for answering the questions be explained before beginning each section. Although the answer sheet has been made as simple as possible, it is recommended that the examiner use five or six older children who can act as helpers, keeping the younger students on the right portion of the answer sheet. These student helpers need to be trained not to give clues about the correct answers. It is important to establish that all children in the class who will be assessed can differentiate among the symbols used on the answer sheet; a short review of the format and symbols should precede the test administration.

The responses alternatives for Section III on Form 9 (the knowledge items) are presented using slides projected on a screen. The slides are divided into quandrants, each with a picture of one of the response alternatives and a geometric shape. A corresponding quandrant with the same geometric shapes is presented for each item on the answer sheet. As the response alternatives are read, the examiner should use a pointer to point to the appropriate quandrant on the screen, saying the name of the object(s) represented. When all four quandrants have been named, it is recommended that the examiner go back to the top left quandrant, saying "If you think the answer is (object in quandrant) mark the (symbol) on your paper." This procedure would be continued for all four quandrants.

CANKAP
Form 8 (Students: Grades 2-3)
Answer Key

Attitudes*

4. +
5. +
6. +
7. -
8. -

Practices**

13. +
14. +
15. -
16. +
17. +

Knowledge

18. 2
19. 2
20. 3
21. 2
22. 3
23. 3
24. 3
25. 1
26. 4
27. 3
28. 4
29. 4
30. 4
31. 3
32. 2
33. 4
34. 4
35. 3
36. 4
37. 3

* - = 1 is best answer
+ = 3 is best answer

** - = 1 is best answer
+ = 2 is best answer

Note: Items 1-3 and 9-12 are not a part of the CANKAP. They were designed to measure perceptions of nutrition education as part of the longer instrument, Assessment of Nutrition Knowledge, Attitudes, and Practices and Perceptions of Nutrition Education.

APPENDIX C

NUTRITION CONCEPTS BY GOAL AND GRADE LEVEL

Goal	Level 3	Other Levels
Goal I: Understand the relationship of nutrition to health	Q2 Food and growth needs Q4 Nutrients in foods Q5 Health and food choices	Q1 Food for people of different ages Q3 Kinds of nutrients Q6 Diets
Goal II: Understand the relationship between individual and environmental characteristics and food-related behavior	Q11 How food looks and tastes Q14 Change and how we feel about food Q16 How food gets to us	Q12 Food from different cultures Q13 What other people tell us about food
Goal III: Understand the physical and chemical properties of food	Q8 Foods that need to be cooked; foods that need to be refrigerated Q10 Energy and nutrients	Q7 Cooking Q9 Simple meals
Goal IV: Understand the nature and means of resolving food- and nutrition-related concerns	Q15 Choosing which foods to eat Q18 How resources are used to solve food problems Q19 Ways to solve food problems Q20 How to learn about nutrition	Q17 World food problems

APPENDIX D

CHILDREN'S INTERESTS IN NUTRITION EDUCATION CONCEPTS

CHILDREN'S INTERESTS IN NUTRITION EDUCATION CONCEPTS

Interview Schedule

Child's name_____

Child's age_____ Child's gender_____

Section 1

Child's definition of nutrition:_____

_____

Section 2

Pictures represent nutrition concepts. They are shown to the child in the following order:

Q1 Food for People of Different Ages
Q2 Food and Growth Needs
Q3 Kinds of Nutrients
Q4 Nutrients in Foods
Q5 Health and Food Choices
Q6 Diets
Q7 Cooking
Q8 Foods that Need to be Cooked
Q9 Simple Meals
Q10 Energy and Nutrients
Q11 How Food Looks and Tastes
Q12 Food from Different Cultures
Q13 What Other People Tell Us About Food
Q14 Change and How We Feel About Food
Q15 Choosing Which Foods to Eat
Q16 How Food Gets to Us
Q17 World Food Problems
Q18 How Resources are Used to Solve Food Problems
Q19 Ways to Solve Food Problems
Q20 How to Learn About Nutrition

Section 3

Child's ideas about T. V. show:_____

_____

Section 4

Child's interest in nutrition education concepts:

Most Important				Least Important			
1	2	3	4	4	3	2	1
___	___	___	___	___	___	___	___
	___	___	___	___	___	___	
		___	___	___	___		
			___	___			
8	7	6	5	4	3	2	1

Section 5

Child's ideas concerning why which concept was most important:

_____

_____

Least important: _____

_____

PROCEDURE FOR ADMINISTRATION

This interview schedule is designed to be administered to children individually in a relaxed atmosphere. At the beginning of each interview session, the interviewer needs to spend a short amount of time getting acquainted with the child and trying to put that child at ease. After this informal get-acquainted period, the interviewer can proceed with the interview session. During each session, the interviewer should encourage children to ask questions or interject comments pertinent to the interview questions. The interviewer, however, also needs to provide enough structure to the interview to keep the child and himself/herself within the allotted time frame. The average time for an interview session is approximately 20 minutes. The interview form used during these sessions consists of five separate sections that are designed to elicit from children different types of information.

Section 1

Section 1 of the interview schedule was designed to elicit information concerning children's definitions of nutrition. The interviewer says to the child, "I need your help. I am trying to find out what children your age need and want to know about nutrition. Tell me what nutrition is." The interviewer records the child's response to the statement on the spaces provided. It is appropriate for the interviewer to ask children to clarify their responses. Further, at the end of each child's definition, the interviewer needs to ask, "Can you think of anything else?"

Section 2

Section 2 of the interview schedule was designed to expand children's ideas about nutrition by exposing them to different concepts connected with the study of food and food-related behavior. The interviewer says, "Okay, there are other things we can talk about when we study nutrition. These pictures (see concept cards) can help us talk about some of these things. Let's look at them." The child is encouraged to read the word cues under each picture card. In cases where children have difficulty reading these cues, the researcher reads the captions aloud. In all cases (i.e., whether the child is able to read the captions successfully or not), the interviewer expands the captions in a uniform attempt to explain further each concept. Explanations used for concepts are as follows:

Item	Concept	Expansion of Concept
Q1	Food for people of different ages	"How people need different kinds of food at different ages"
Q2	Food and growth needs	"How your body uses food to help you stay healthy, give you energy, and help you grow"
Q3	Kinds of nutrients	"Different kinds of nutrients such as protein, water, fats, minerals, carbohydrates, and vitamins"
Q4	Nutrients in foods	"Different kinds and amounts of nutrients in different foods"
Q5	Health and food choices	"How the kinds of foods we eat affect our health"
Q6	Diets	"What foods to eat if you want to lose weight"
Q7	Cooking	"Different ways of fixing foods"
Q8	Foods that need to be cooked; foods that need to be refrigerated	"Foods that need to be cooked so they will be safe to eat and foods that need to be refrigerated so they won't spoil
Q9	Simple meals	"Healthy meals that are simple to fix"
Q10	Energy and nutrients	"Which foods give your body more energy and nutrients than others"
Q11	How food looks and tastes	"How food looks and tastes affects how we feel about it"

Item	Concept	Expansion of Concept
Q12	Food from different cultures	"Foods from different countries and different cultures"
Q13	What other people tell us about food	"How what other people tell us about food affects how we feel about it"
Q14	Change and how we feel about food	"Change and how time affects how we feel about food"
Q15	Choosing which foods to eat	"How different food choices not only affect us but other people as well"
Q16	How food gets to us	"How food is grown, processed, and transported before it gets to us at the grocery store"
Q17	World food problems	"Food problems people have in different places"
Q18	How resources are used to solve food problems	"How resources such as computers, telephones, books, money, and people are used to help solve food problems"
Q19	Ways to solve food problems	"How food problems are solved in different ways"
Q20	How to learn about nutrition	"Different ways of learning about nutrition--which sources (people, magazines, books, television, shows and advertisements) give us better information than others"

Section 3

Section 3 of the interview schedule form consists of an open-ended question for children designed to gather general information concerning their perceptions of what nutrition concepts are interesting to other children their age. The following is read aloud to each child by the interviewer: "Now let's pretend you are the producer of a television show about nutrition for children your age. What do you think would be good to talk about on the show?" The child's response is recorded in spaces provided on the interview form.

Section 4

Section 4 of the interview schedule contains spaces for recording Q-sort rankings. Letters corresponding to labels on the picture concept cards (see Appendix D) ranked by each child from most to least important are arranged in appropriate order in these spaces. In guiding each child through the Q-sort, the interviewer proceeds in the following manner: "Okay, now we are going to do something else." The interviewer spreads out all the cards so they are visible to the child. "Now pick the card you think would be most important to show on your television program. Now pick the one you think would be least important to talk about. Okay, pick two you think are most important. Now pick two that are least important." During this procedure, the interviewer arranges the cards chosen by each child into the configuration corresponding to spaces provided for card labels in Section 4 of the interview form.

Section 5

Section 5 of the interview schedule consists of two questions designed to provide some indications regarding why children ranked certain nutrition education concepts as "most important" and others as "least important." These questions are asked in the following manner: "Okay, why did you say [concept mentioned] is most important? Why did you say [concept mentioned] is least important?" The child's response to each question is recorded under that question in spaces provided on the interview form.

Concept Cards

Food for People of Different Ages

Food and Growth Needs

Protein

Water Fats

Minerals

Carbohydrates

Vitamins

Kinds of Nutrients

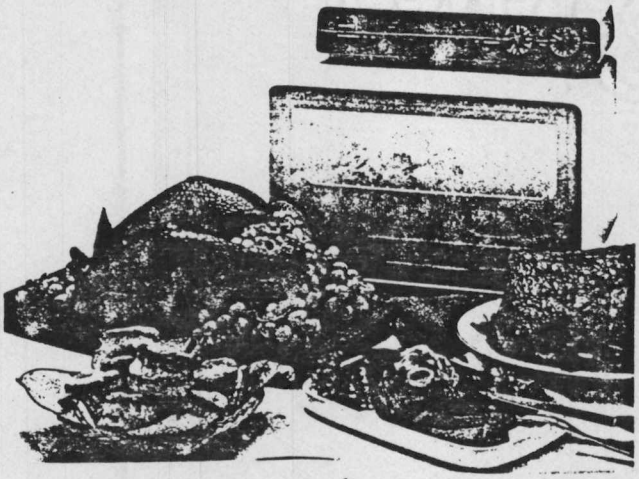
Nutrients in Foods

Health and Food Choices


NEW WISH-BONE LITE CREAMY CUCUMBER DRESSING
ALL THE FLAVOR YOU WANT.
MINUS THE CALORIES YOU DON'T.
Wish-Bone
NEW
REAL CUCUMBER BITS
LITE
creamy cucumber
A REDUCED CALORIE DRESSING
FOR ALL.
CANNED FRUIT COCKTAIL
FRUIT COCKTAIL COMMITTEE

Diets

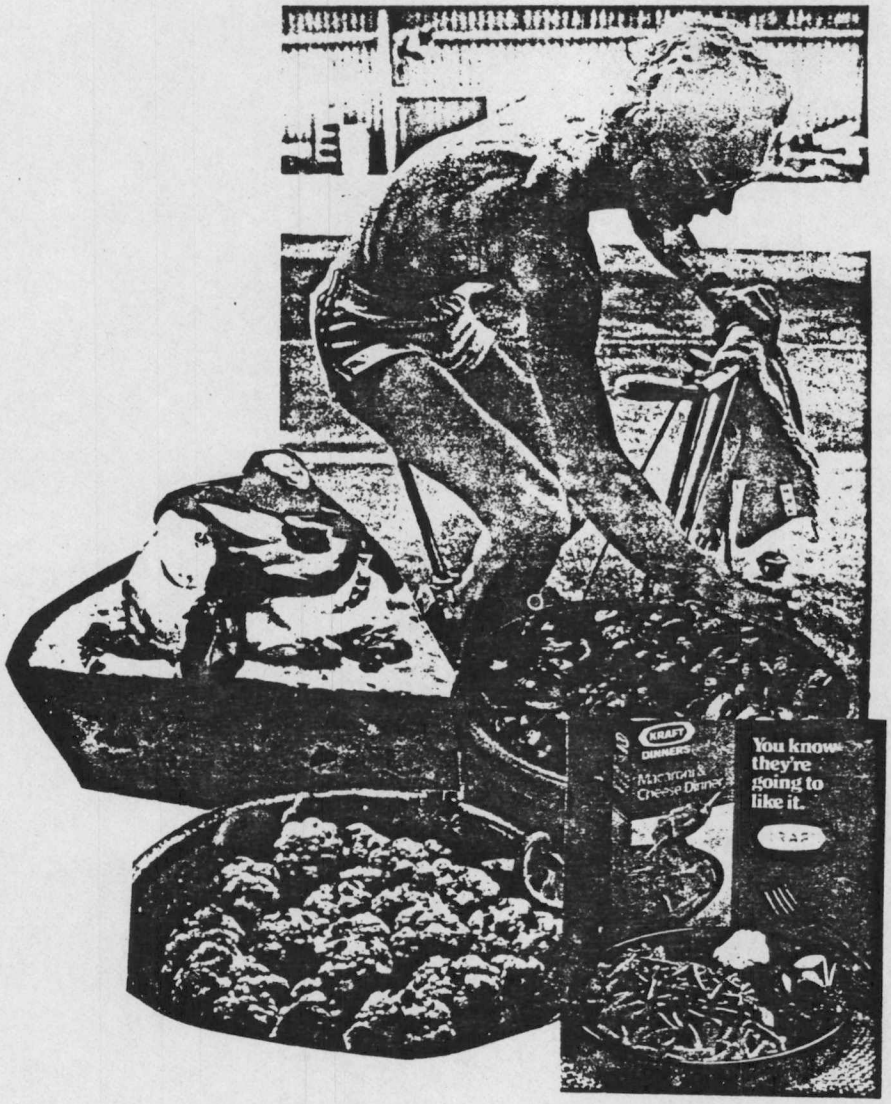
Cooking



Foods that Need to be Cooked

Foods that Need to be Refrigerated

Simple Meals



Energy and Nutrients

How Food Looks And Tastes

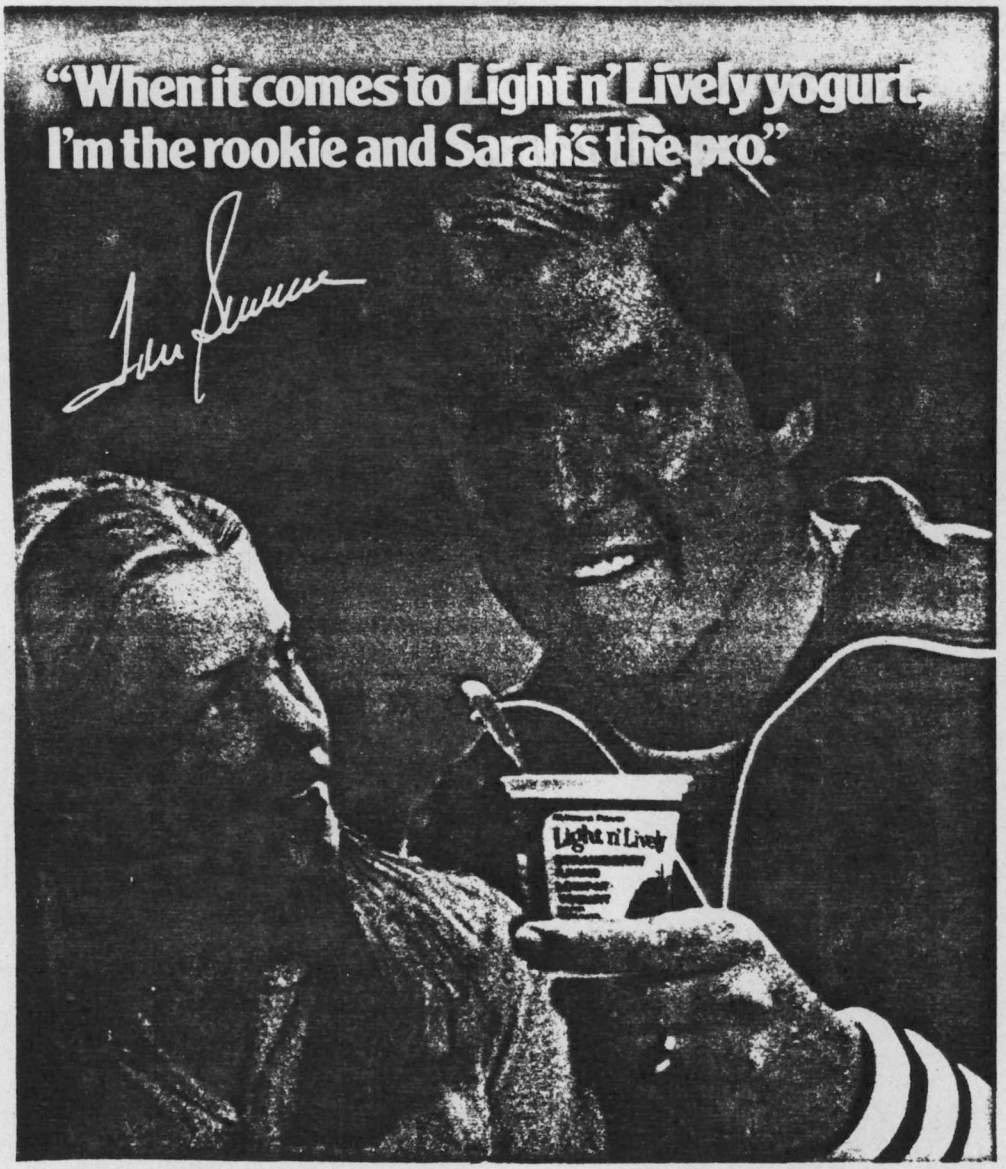
Catch your own seafood dinner at a floating restaurant.

Hong Kong's markets overflow with intriguing items.

As much a feast for the eyes.

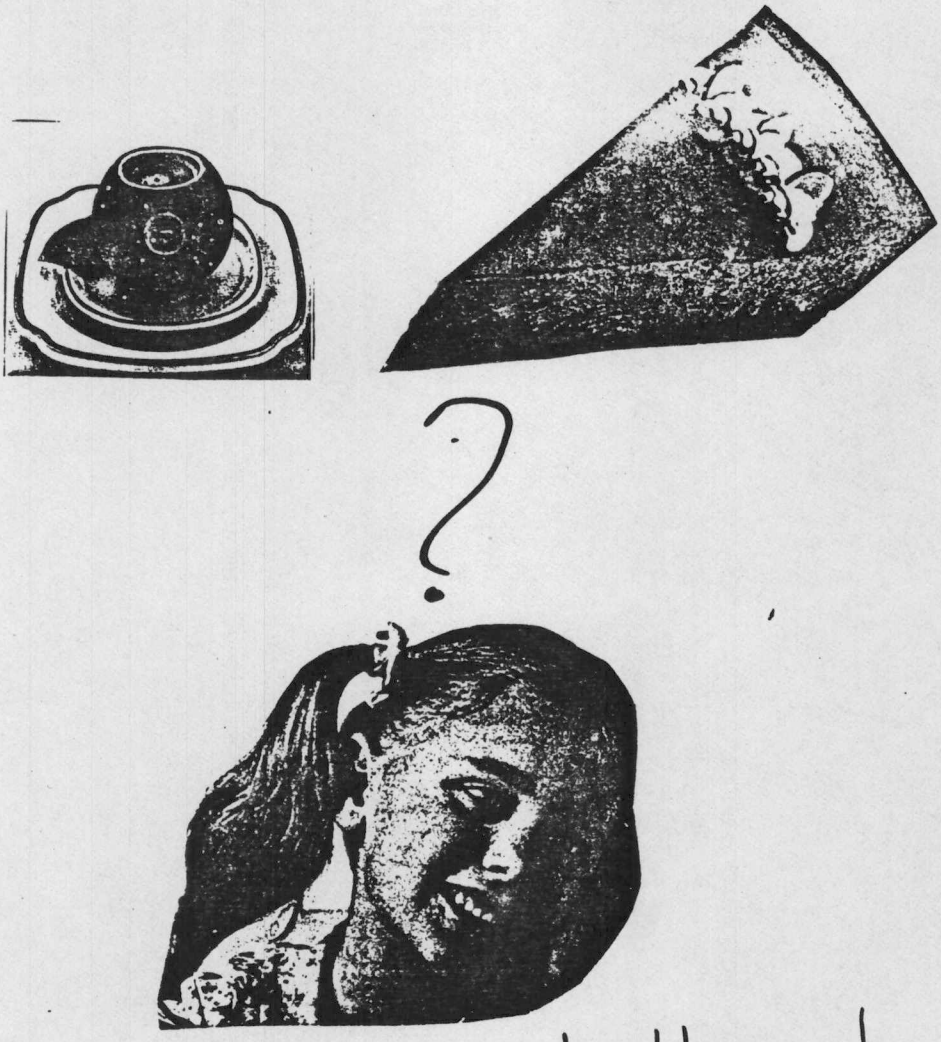
Enjoy the fruits of an inherited love of food.

Food from Different Cultures

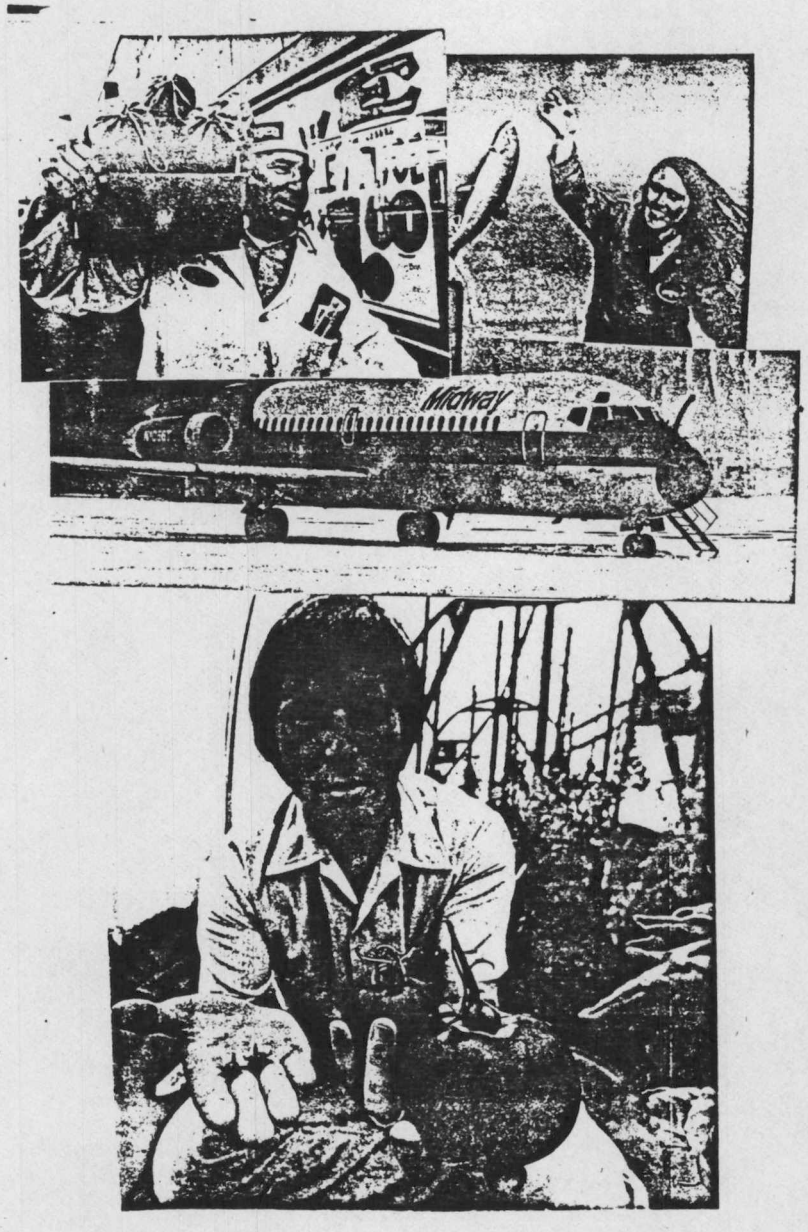


What Other People Tell Us About Food

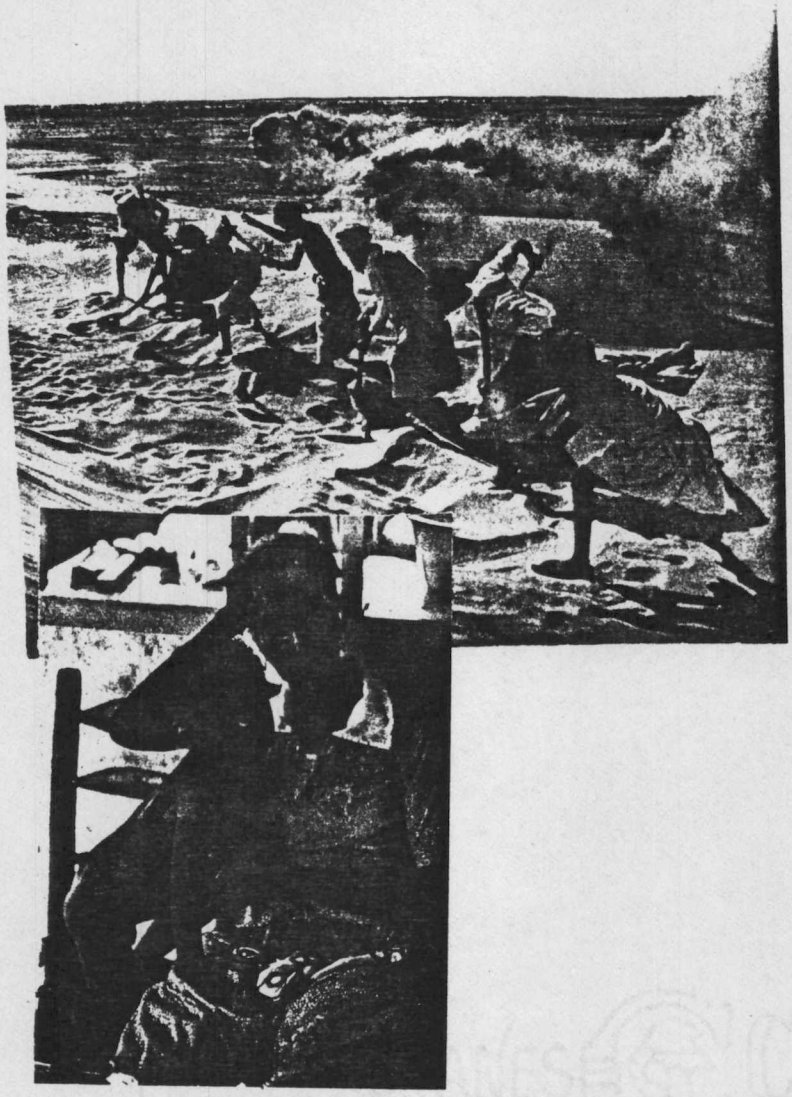
Change and How We Feel About Food



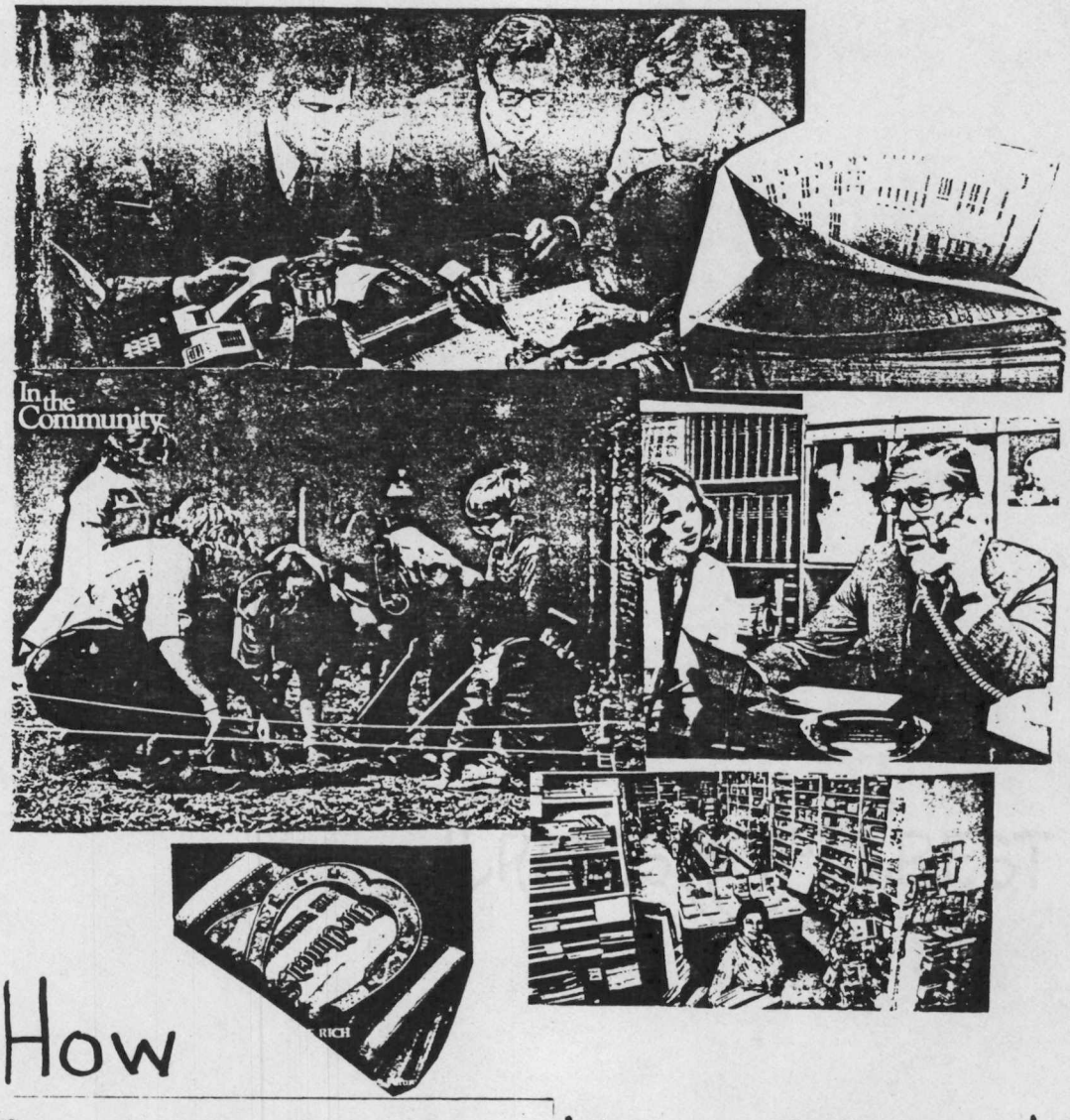
Choosing Which Foods to Eat



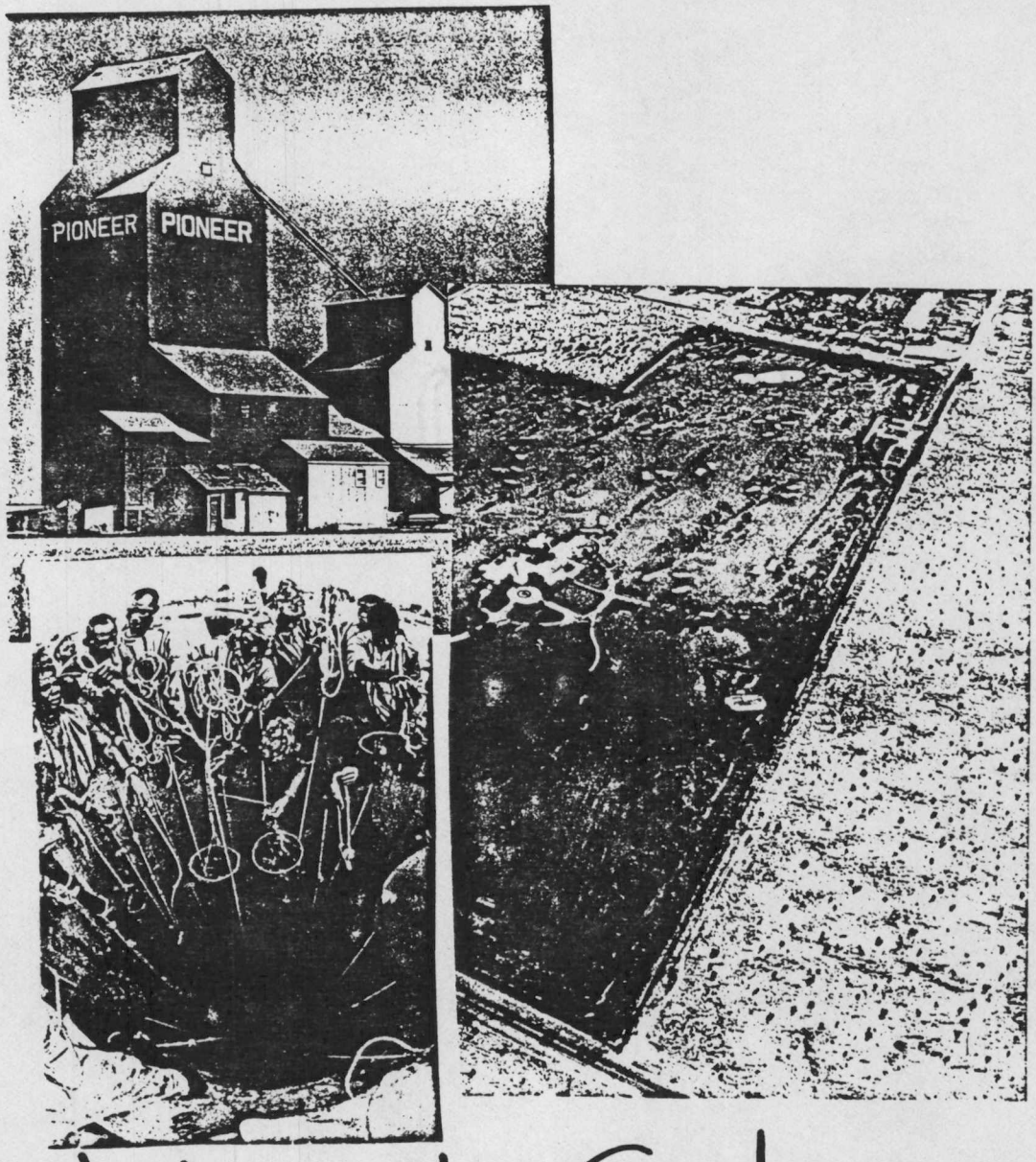
How Food Gets To Us



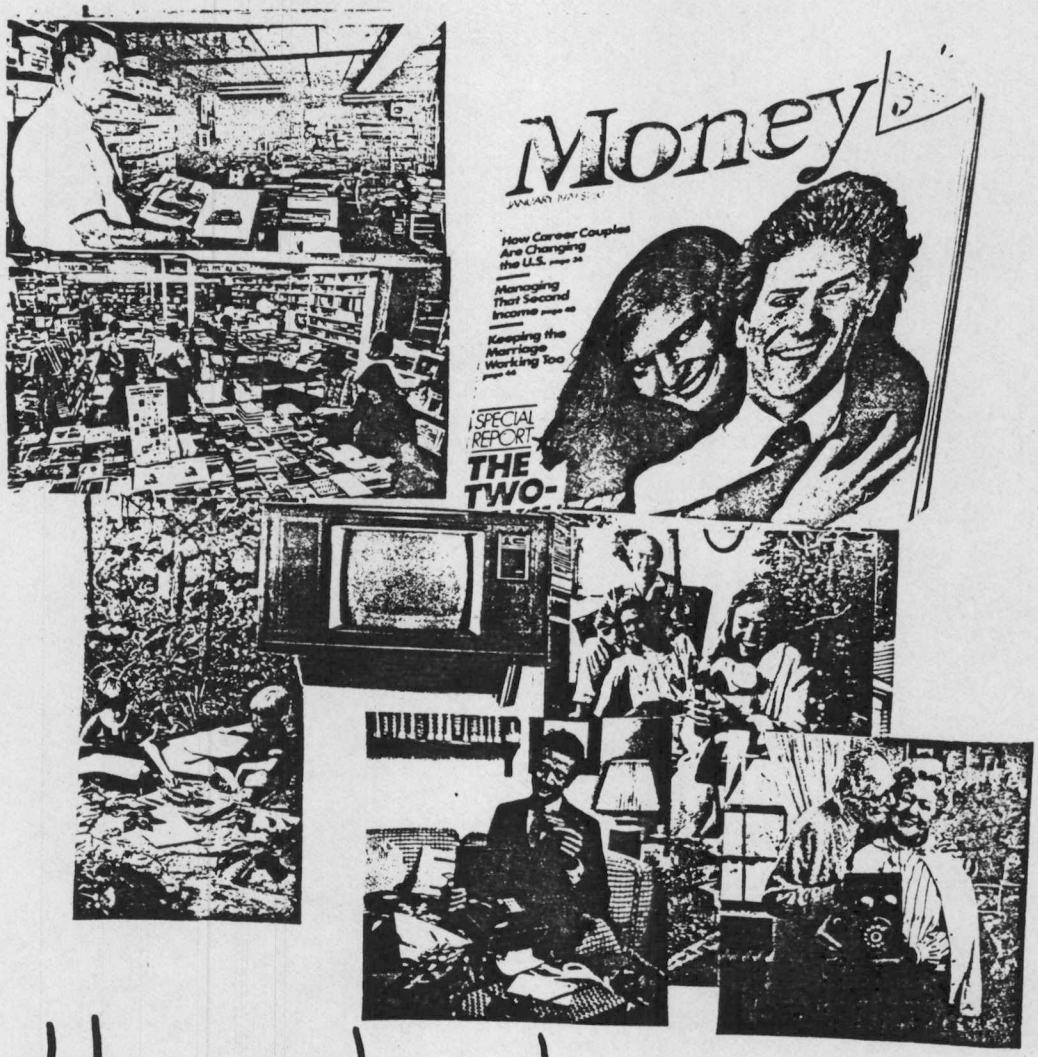
World Food Problems



How Resources Are Used to Solve Food Problems



Ways to Solve Food Problems



How to Learn About Nutrition

APPENDIX E

EXAMPLES OF REASONS CHILDREN GAVE FOR CHOOSING CONCEPTS AS "MOST IMPORTANT"

Item	Concept	Example
Q4	Nutrients in foods	"Nutrients help your body grow." "You need to know about food and nutrients in food and drink to keep yourself healthy." "You need to know how many calories and how much fat foods have in them." "You need nutrients to keep your blood line good."
Q15	Choosing which foods to eat	"You need to choose which foods to eat so your teeth won't rot and so you'll be healthy." "If you eat sweets you can rot your teeth out if you eat too much of them." "You can choose which to get—something with nutrition or something without nutrition."
Q11	How food looks and tastes	"You need to learn to eat foods that look terrible but may taste good." "You gotta taste something before you know whether you like it or not."
Q17	World food problems	"People in other countries need food like us." "Some people don't have hardly any food where they live."
Q5	Health and food choices	"People need food and water." "Fruits and vegetables are healthy for me."

Item	Concept	Example
Q10	Energy and nutrients	"It gives you more strength." "It's kind of hard to understand about nutrition. Like some of those big old, long words—kids don't know what they mean."
Q1	Food for people of different ages	"You need different foods when you're different ages." "The baby [in the picture] doesn't need what we have."
Q3	Kinds of nutrients	"You need protein, water, fats, 'cause they're good for you and you need to eat at least one of them every day." "You'd like to learn what kind of nutrients they are."
Q8	Foods that need to be cooked; foods that need to be refrigerated	"Like if you didn't cook an egg, it wouldn't be good for you." "You need to know which foods spoil."
Q6	Diets	"If you go on a diet, you have to learn all the things that you need to eat and everything." "If you get to be overweight, it's not healthy. You could have a heart attack."
Q16	How food gets to us	"Food makes you grow and makes you healthy."
Q18	How resources are used to solve food problems	"'Cause it was to solve food problems people have."
Q19	Ways to solve food problems	"I would like to see somebody down there with food."

Item	Concept	Example
Q14	Change and how we feel about food	"Sometimes you don't like something but then you do later."
Q20	How to learn about nutrition	"If you don't learn about nutrition, you could go and not eat the things that you need."
Q2	Food and growth needs	"You need stuff to heal your body so it doesn't get infected."
Q13	What other people tell us about food	"We learn about it. Like they tell us yogurt is good for us—then we try it."
Q9	Simple meals	"Good stuff [in the picture] gives you protein. Cheese and apples are good for you."

Notes. Concepts are listed in order of children's ranking (i.e., highest to lowest number of weighted values).

Concepts Q7 ("Cooking") and Q12 ("Food from different cultures") were not selected by any children as most important.

VITA

Margaret Payne McCabe was born in Knoxville, Tennessee, on April 26, 1950. She attended elementary schools in that city and was graduated from Bearden High School in June 1968. The following September she entered Furman University in Greenville, South Carolina. In the summer of 1972 she received a Bachelor of Science degree in Elementary Education from The University of Tennessee, Knoxville.

From December 1972 through August 1975 she was stationed in Europe with her husband, Robert Ainsley McCabe, who was serving in the United States Army. During this time she worked for the United States Army Special Services Division.

From September 1975 through June 1978 she taught kindergarten in the Knoxville City School System. During this time she began studying toward a Master's degree in Child and Family Studies. This degree was awarded in August 1978.

In the fall of 1978 she accepted a teaching assistantship at The University of Tennessee, Knoxville, and began studying toward a Doctor of Philosophy degree in Home Economics. She received a General Foods Fellowship for the school year 1979-1980. During 1980-1981 she served jointly as a graduate teaching assistant and coordinator for Tennessee's Nutrition Education and Training Program evaluation project. This dissertation was written as a partial requirement for completion of a Doctor of Philosophy degree in Home Economics; collateral areas for this interdisciplinary degree include child development, food science, and educational evaluation.