To the Graduate Council:

I am submitting herewith a dissertation written by Wilma Wohlwend Jozwiak entitled "Teaming to Teach Nutrition: Prediction of Students' Knowledge, Attitudes, and Practices." 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 Economic.

Jo Lynn Cunningham, Major Professor

We have read this dissertation
and recommend its acceptance:

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Accepted for the Council:

The Graduate School

TEAMING TO TEACH NUTRITION:

PREDICTION OF STUDENTS' KNOWLEDGE, ATTITUDES, AND PRACTICES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Wilma Wohlwend Jozwiak

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ABSTRACT

Teaming to teach is a form of team teaching in which team membership can include the classroom teacher and any types of individuals from the school and/or community. The purpose of this study was to investigate the relationships between students' nutrition-related knowledge, attitudes, and practices and teaming to teach variables.

This study was conducted in collaboration with the Tennessee Nutrition Education and Training (NET) Program evaluation component. Students' data were obtained using the Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices scores from the spring, 1982, NET assessment. Teachers' data were collected using the Teaming to Teach Nutrition Questionnaire that same spring. A sample of 71 teachers and their classrooms in schools throughout Tennessee were selected for participation.

Relationships were found between students' nutrition-related knowledge and attitudes and (a) the number of components of nutrition education instruction in which the teacher chose to use a team and (b) the degree to which certain types of individuals were involved as members of a team. Relationships also existed between students' nutrition-related attitudes and (a) the number of types of individuals who were included in nutrition education teaching teams and (b) the degree to which teaming to teach was used in certain components of instruction. No relationships were found between teaming to teach variables and students' nutrition-related practices. Implications are presented for nutrition education for young children; changing

knowledge and attitudes; and further research in nutrition education, team instruction, and the modification of practices.

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CHAPTER I

INTRODUCTION

Team teaching has emerged as one of the most enduring educational innovations of the 1960s. Originally advocated as a means of making the most efficient use of staff, team delivery of instruction now is in use in elementary schools throughout the country. Although team teaching teams traditionally have included only the classroom teacher(s) and sometimes teacher aide(s), teaching teams potentially could include many different types of individuals.

Evaluations of Team Teaching

Although the use of team teaching now is widespread, evaluations of team teaching as reported in the literature have been inadequate. Part of the problem lies with the close association in the minds of many educators between team teaching and "open-space" education, in which instruction occurs in large, multi-class instructional spaces free of architectural barriers. Open-space architectural design sets the stage for team teaching because at least two teachers work in each instructional space. As a result, although proximity does not lead necessarily to team teaching, investigators often have confounded open-space education and team teaching, treating them as two faces of the same coin (Burchyett, 1973; Burham, 1971; Dougherty, 1979). Similarly, other forms of cooperative teaching such as departmentalization, in which teachers specialize in one or more academic areas for two or more groups of

children but do not plan, implement, or evaluate instruction as a team, often are confounded or confused with team teaching (Georgiades & Bjelke, 1966).

The design and scope of team teaching studies also have been limited. The earliest studies were subjective and descriptive, often comprising no more than a first-person narrative report of a team-teaching situation (Gallessich & Iscoe, 1972). Studies in which attempts have been made to measure relationships between team teaching and students' outcomes often have been focused solely on affective outcomes (Gallessich & Iscoe, 1972) or based on small samples drawn from one or two schools or from schools in only one school district. Restrictions also have been placed on team membership in most reported studies; researchers seldom have studied teams that included members other than teachers and teacher aides. Investigations of any aspect of team teaching have declined in number since the mid-1970s. Most investigators who have disseminated studies since the mid-1970s have focused on structural aspects of team teaching (e.g., intrateam interaction, administrative features of team taught schools).

Need for Further Investigation

It is difficult to make a strong argument for the effectiveness of team teaching across different types of team members because of shortcomings in reported evaluations of this instructional delivery method. To avoid the shortcomings of previous studies, studies that are objective and focused on academic outcomes are needed. In

addition, studies are needed that include larger, more representative samples; that are based on a nonrestrictive definition of team membership; and that avoid confounding team teaching with other forms of cooperative teaching or open-space education.

The choice of an academic subject in which to base an evaluation of team teaching is important. The subject should be one that is easy to conceptualize as being team taught; that is, it should be multidimensional in nature so that persons from several different skill areas legitimately may participate in instruction. In addition, the subject should be one that can be integrated with other subjects. Integration of the subject matter with other subjects can allow more flexibility in the use of persons from various disciplines in an instructional delivery team.

One subject that meets the criteria for assessing the value of teaming to teach is nutrition education. Many different types of individuals can be involved in the various aspects of the provision of nutrition education. Nutrition education also can occur in many different settings and can be integrated with other subject matter when appropriate.

Conceptual Framework

The educational environment in which a child's formal instruction takes place may be viewed as a set of interrelated levels of systems. From a system theory perspective, the elementary school student may be seen as the central organism in the classroom setting ("a place where people can engage in face-to-face interaction") (Bronfenbrenner, 1979, p. 22).

System Levels

Microsystems are the settings in which people interact with one another on a frequent face-to-face level (Bronfenbrenner, 1979; Garbarino, 1982). The elementary school student is affected by microsystems such as the elementary classroom, the elementary school, the home, and the community. In the context of education, the elementary school classroom may be considered the target microsystem in that it is likely to exert the greatest influence in the student's formal education, whereas other related microsystems (e.g., the larger elementary school, family, community) may be considered extended microsystems.

Mesosystems consist of relationships between or among microsystems in which the student interacts (Garbarino, 1982). Mesosystems potentially can exist between the elementary school microsystem and any of a number of extended microsystems such as the family and the community, but in general practice such mesosystems may exist only in the most tenuous sense. For instance, the mesosystem between the classroom and family may consist only of formalized written communications such as report cards. The mesosystem existing between the elementary school classroom and the elementary school itself usually is more extensive by necessity, if only to accommodate the scheduling needs of various groups within the school.

These specific and extended microsystems and mesosystems exist in relationship with exosystems and macrosystems. Exosystems are "settings in which the child does not participate but in which decisions are made affecting the child or adults who do interact directly

with the child" (Garbarino, 1982, p. 28). Macrosystems are "'blueprints' for defining and organizing the institutional life of the society" in which the student lives (Garbarino, 1982, p. 28). Examples of exosystems that exist in relation to the classroom microsystem are the functioning of the local school board, the state department of education, schools attended by siblings of the developing person, and parents' places of work. Macrosystems include "ideolog[ies], social polic[ies], shared assumptions about human nature, the 'social contract'" (Garbarino, 1982, p. 28) (see Figure 1).

System Structure

The systems that affect student academic development may be described in terms of their relative degrees of openness to information. Systems are defined or limited by boundaries, which control the type and amount of information that enter the system (Harries & Harries, Note 1). System boundaries include temporal boundaries, which define the hours or time period during which the system functions; physical boundaries, which define the space in which the system functions; and social boundaries, which define system membership.

For instruction to be conducted by a team, some of the boundaries of the elementary school classroom must be open. For instance, the social boundaries must allow entry of persons other than the teacher, student, and possibly teacher aide who usually comprise a classroom. Open temporal and physical classroom boundaries make it possible for classroom microsystem activities to occur at alternate times and places (i.e., after-hours field trips).

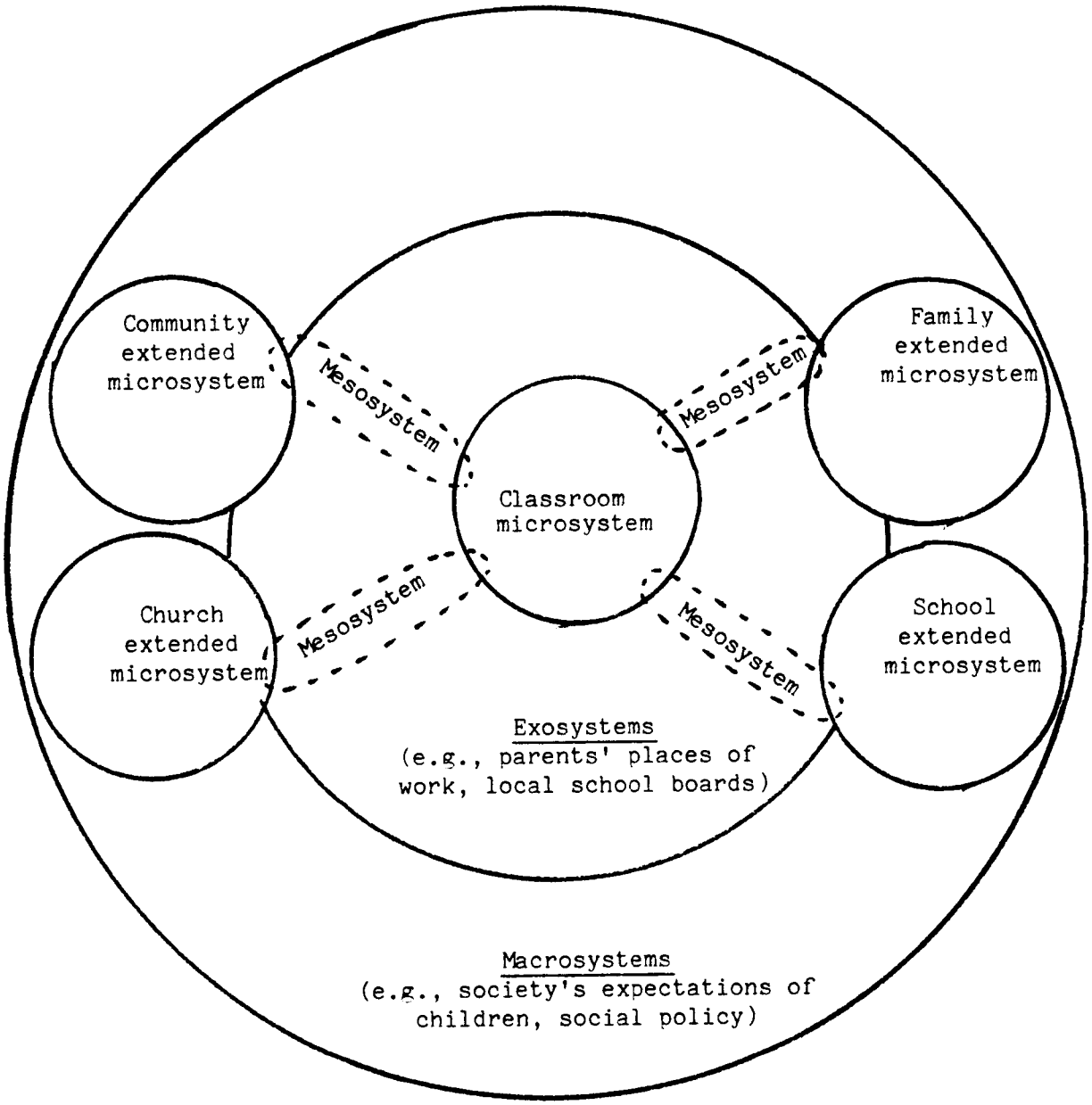

Figure 1. Relationships among levels of systems associated with elementary school students. (Adapted from Garbarino, 1982, p. 26.)

The roles existing within a system also can be used to give the system definition. Examples of roles normally thought of as being components of the target classroom microsystem are student, teacher, and paraprofessional aide. The elementary school extended microsystem includes, in addition to those roles found in the classroom microsystem, building-level administrators; teaching support staff (e.g., media specialists, guidance counselors); and ancillary staff (e.g., maintenance and clerical staff). Persons holding roles in other mesosystems also can influence student academic development. Parents (members of the family extended microsystem) and resource persons from the community extended microsystem (e.g., specialists such as nutritionists, dietitians, trained medical personnel, and nonspecialist resource persons who volunteer to help) can be involved in instruction at the invitation of the classroom teacher. On the other hand, influence from persons holding roles in related exosystems (e.g., the parents' places of work, the state board of education) usually is indirect; while acting in their exosystem roles, these persons are unlikely to interact directly in the instructional process at the microsystem level.

Classification of systems also can be facilitated by examination of the activities that occur in the systems. Both the classroom microsystem and the elementary school extended microsystem have as their primary foci learning related activities. Most activities that occur in the classroom and the elementary school are intended to lead directly or indirectly to learning on the part of the student

or, in the case of ancillary services, to support those persons whose responsibility is to instruct.

Finally, systems can be defined in terms of the interpersonal relations that exist within them. The classroom microsystem normally includes interactions between and/or among students, teachers, and, if applicable, paraprofessional aides. Interpersonal relations in the elementary school extended microsystem can occur between and/or among persons filling the extended microsystem roles. Although instructional relationships can exist between a student and any member of the classroom microsystem and/or elementary school extended microsystem, these interactions usually occur only between teacher and/or paraprofessional aide and student.

System Purpose

A system's roles, activities, and interpersonal relationships exist to reinforce the system's structure and/or objectives. The primary purpose of both the classroom microsystem and the elementary school extended microsystem is to produce changes in the level and content of student knowledge, attitudes, and practices. For the purposes of this study, knowledge may be defined as information concerning concepts relating to a specific topic area; for example, Gifft, Washbon, and Harrison (1972) referred to nutrition knowledge as information concerning nutrition and nutrition-related concepts. Attitudes are relatively durable sets of beliefs that are related to an object or situation and predispose an individual to respond in a preferential manner (Rokeach, 1972). A practice is a "repeated

or customary customary action . . . the usual way of doing something" (Woolf, 1974, p. 902). The activities that occur in the classroom and elementary school usually are related directly or indirectly to the attempt to change the level or content of student knowledge, attitudes, and/or practices. Classroom microsystem membership is determined by the microsystem purpose as well, because the classroom roles are those that support the purpose.

System Process

The process through which the purpose of the classroom microsystem is fulfilled is the exchange of information occurring as a result of interpersonal relationships among persons in the classroom microsystem and persons from related extended microsystems and exosystems who are given instructional roles. Any limitations placed on the types of persons who can fill instructional roles will place restrictions on the instructional process. Instructional interpersonal relationships generally have been limited to persons traditionally filling classroom microsystem roles. Allowing persons other than those traditionally filling classroom roles to participate in instruction should result in changes in the quantity and quality of information exchanged in the microsystem.

Teaching teams within the classroom microsystem. Teaming to teach involves cooperative planning, implementation, and/or evaluation of instruction between a classroom teacher and one or more other persons. The term teaming to teach is used in the current study to distinguish this form of teaming from the term team teaching

which has come to be associated with a more restrictive definition of team membership in which only teachers and teacher aides are team members. Teaming to teach is one instructional delivery system that can result in removal or lessening of the restrictions on the types of persons who can fill instructional roles. Although instruction typically is conducted by adult members of the classroom microsystem, in the teaming to teach method of instructional delivery, instructional relationships can include persons who are members of the elementary school and/or other related extended microsystems, including the students themselves, because no restrictions are placed on the degree to which responsibility for instruction must be shared among team members. In addition, open-space architectural arrangement is not required on either an explicit or an implicit level for teaming to teach to occur.

The teaming to teach procedure will vary from classroom to classroom depending on the needs and interests of the classroom teacher. Teaming to teach can vary in terms of the individuals involved and the instructional components in which they are involved, the degree of involvement, and the general extent of teaming to teach used in the classroom.

Persons who team and instructional components in which teaming occurs. The members of a teaming to teach team can be as varied as the imagination of the classroom teacher allows. Examples of different types of individuals who team to teach along with the classroom teacher are other teachers; school support staff (e.g., media

specialists, guidance counselors); building-level administrators; ancillary school staff (e.g., food service, clerical, and maintenance staff); school district administrators; resource persons (e.g., nutritionists, health care specialists, and other nonspecialist resource persons from the community); parents; and students. Examples of different types of instructional components in which team teaching occurs include developing goals and objectives, providing background information, developing materials, conducting activities, and evaluating activities or programs.

Levels of teaming to teach. Teaming to teach can occur at different levels of involvement. Differences may exist in the number of types of instructional components in which teaming occurs; for example, in one classroom, teaming to teach may occur only in developing goals and objectives, whereas in another classroom, goal development, development of materials, activity implementation, and evaluation all may feature team involvement.

The number of types of individuals who team also may vary. The teacher in one classroom may choose to involve parents, nutritionists, media specialists, the principal, and school district supervisors in teams for the planning, implementation, and/or evaluation of a nutrition education unit. In another classroom, the teacher may choose to take full responsibility for all aspects of instruction in nutrition education.

Degree of involvement in teaming to teach. Teaming to teach also may be varied in terms of degree of involvement. Degree of

involvement is a function of the amount of team effort expended by different type of individuals in different types of instructional components.

The degree of involvement--instructional components is the degree to which all of the different types of individuals are involved in a specific type of instructional component. For instance, a teacher may have chosen to use team involvement in the implementation of instructional components in nutrition education; although the degree of involvement of one individual is likely to vary from the degree of involvement of another type of individual, one can look at team involvement across all types of individuals to determine what is typical for instructional component implementation in that classroom microsystem.

The degree of involvement--types of individuals is the typical degree of involvement of a particular type of individual across all types of instructional components. One teacher may have involved food service personnel in instructional teams about 75% of the time when all types of activities are considered together, whereas another teacher may have involved food service personnel in only one type of instructional component; even if food service personnel were involved 100% of the time in that one instructional component, the overall degree of involvement across all types of instructional component would be considerably less than 75%.

Finally, the general extent of teaming may be considered. This concept, which is a composite of the other four, comprises an overall view of teaming to teach in a given classroom microsystem.

The general use of teaming to teach may be conceptualized as the average degree of involvement of all types of individuals who team to teach a subject across all instructional components in which teaming to teach occurs in a given classroom microsystem.

Assumptions

The assumptions underlying the current study are related to the instructional environment of the elementary school student. Specifically included are assumptions related to teaming to teach; system theory; knowledge, attitudes, and practices; and nutrition education.

Teaming to teach is assumed to be a viable instructional procedure currently used by teachers in many settings. All types of elementary classroom miscrosystem members and members of related extended microsystems (e.g., the elementary school, the family, the community) can be involved in varying degrees in teaming to teach. Members of exosystems (e.g., the state department of education, the parents' place of work) seldom are involved directly in instruction in their exosystem roles.

It is assumed that an elementary school classroom is a microsystem existing in relation to extended microsystems, such as the family or the community, and exosystems, such as the state department of education, all of which exist in association with macrosystems such as societal expectations for children. It is assumed that mesosystems comprising relationships between the classroom microsystem and related extended microsystems or exosystems can exist in

varying degrees. The primary purpose of the elementary classroom microsystem and the elementary school extended microsystem is assumed to be the production of changes in the level and content of students' knowledge, attitudes, and practices in selected areas. It is assumed that classroom microsystems boundaries can open to allow information to enter in the form of instruction by persons other than the classroom teacher and/or teacher aide; instruction presented by such individuals is assumed to have the potential to increase the quality and quantity of information presented as instruction to students.

Knowledge, attitudes, and practices are assumed to be interrelated; changes occurring in one may produce changes in one or both of the others. However, changes in one of the three components do not necessarily result in changes in the other two. In any case, the resulting changes may be slow to occur.

Nutrition education is assumed to be an important subject for inclusion in an elementary school curriculum. Accurate knowledge about nutrition is assumed to be important for the student's current and future well-being. It is assumed that nutrition education can be integrated with instruction in other academic areas and can be presented through the teaming to teach method.

CHAPTER II

REVIEW OF RELATED LITERATURE

Investigation of teaming to teach in nutrition education involves consideration of concepts from the literature on the use of teams and nutrition education. It is important to consider the current study in the light of results of studies relating to teams, team-instruction, and nutrition education. The teaching team is related to the systemic process of the classroom microsystem. In the case of the current study, the content that defines system purpose is nutrition education.

Team Teaching

The function of teams in providing instruction is similar to the function of teams performing other tasks. The team concept can be found in the literature of several disciplines (e.g., education, educational psychology, industrial psychology). In the educational literature, the history of team teaching and evaluations of team teaching as an instructional procedure are important to the understanding of the current study.

The Team Concept

Individuals frequently are placed in situations in which they are members of groups that must accomplish one or more tasks. The potential of such a task-oriented group often is considered great but elusive. As Woodcock (1979) stated, "a team can accomplish much more

than the sum of its individual members and yet frequently groups of people are seen to achieve less than could have been accomplished by the individual members working alone" (p. 3).

Characteristics of a team approach. According to Shonk (1982), a team comprises two or more people who must cooperate in the conduct of activities to reach a common goal. Shonk stated:

> It is not enough for people to want to coordinate because it would be nice. Coordination must be required to accomplish the task in order to justify setting up the team in the first place. If only a portion of their task required coordination or interdependence, they are a team for only those tasks that reqire interdependence and coordination. . . . The common goal and the coordination required determine whether a team exists. (p. 2)

Although not all authors place such stringent limits on the determination of the need for a team, they agree that coordination of effort and a common goal are characteristic of the team approach (Dyer, 1977; Palleschi & Heim, 1980; Zander, 1974).

Rationale for using a team approach. Many advantages have been claimed for the team approach, both for team members and the people or organizations they serve. One of the advantages often mentioned for team members is the opportunity to divide labor on some basis (e.g., experience, expertise, interest), whereas the individual working alone must handle all aspects of a task (Dyer, 1977; Palleschi & Heim, 1980). Members of a team also can stimulate each other intellectually (Dougherty, 1979) and provide a form of peer supervision or review (Dyer, 1977; Funaro, 1969). Because two or more people are tackling the task, each can stay abreast of the developments in a different component of the task (Dougherty, 1979; Smith, 1968). Team members

also can act as a support group, helping each other maintain motivation through particularly difficult or tedious parts of the assignment (Funaro, 1969; Likert, 1961). In fact, some very complex goals may be reachable only through team effort (Wilson, 1970). Through interdisciplinary links between levels within an organization or system, the structure, aims, and concepts of the involved discipline are modified, becoming coordinated through a common viewpoint or purpose (Jantsch, 1972).

Perhaps as a result of the advantages mentioned, as well as many not yet identified, well-functioning teams usually produce better results in problem-solving tasks. Hall (1971) used a problem-solving activity called Lost on the Moon to demonstrate the advantage of a team over an individual in problem-solving tasks. When the scores achieved by the teams were compared with the previously achieved scores of the individual members of the teams, the group score almost always was higher than any individual score. Often, the group score exceeded the scores of individuals by a large margin.

In addition to being more accurate at problem-solving tasks, teams also can be of advantage in provision of a service in a social setting such as a welfare department or a school. A superior problem-solving ability obviously would benefit the recipients of such services, but, in addition, the very fact that a group is made up of more than one person increases the likelihood that the background experiences of one or more members will hold a key to more effective service for the client. It is also true that in situations in which the delivery of service involves an attempt to change client behaviors, the involvement

of "sufficient exemplars" (e.g., multiple instructors, settings, times) will increase the likelihood that any changes achieved will be generalized across individuals (Stokes & Baer, 1977).

Disadvantages of a team approach. Although teams can be very effective, the team approach is not without disadvantages. Some less complex, smaller problems are approached more rationally by a single individual (Shonk, 1982). Attempting to force such problems into a team approach results in clumsy, overly large solutions and is a waste of team members' time. Some problems with the team approach may occur as a result of badly functioning teams. On occasion, the people in an organization that cause a team to be formed may continue to reward individual effort rather than shifting to rewarding team effort. Team members then are likely to continue to work autonomously on the problem with resulting duplication of effort and fragmentation of team direction (Zander, 1974). The opposite phenomenon may occur when team members become so tightly knit and secure that they become victims of "group think" (Janis, 1972). The members of the team become convinced that as a team they are invincible. Once a course is determined, no conflicting information is allowed to enter the group. Secure in their group, the team censures members who have the nerve to dissent. Even when the team's course becomes badly misdirected, the team protects itself from criticism (Janis, 1972). The group even may create a role for a person or persons whose job it is to prevent contradictory information from entering the group conciousness (Fincher, 1976).

History of Team Instruction in the United States

The use of team teaching is not a new idea. The first American experiments in the use of teaching teams occurred in New York City from 1806 to 1853. Known as the Lancaster monitorial system, this system involved the use of student monitors. One master teacher supervised upper-grade students who acted as monitors. Students were grouped by ability under a chief monitor. Each monitor had teaching and clerical responsibilities for a group of students. These student monitors had no special training for their duties. When classroom overcrowding diminished in the mid-1850s, the Lancasterian system was abandoned (Shaplin, 1964).

In the early 1900s, educators experimented with several forms of cooperative teaching in which teachers shared responsibility for more than one group of students but did not plan, implement, or evaluate instruction together beyond simple scheduling. Notable among cooperative education experiments were the Gary Platoon Plan, the Dual Progress Plan, the Dalton Plan, and the Winnetka Plan (Shaplin, 1964). The Cooperative Group Plan developed by Hoosic (cited in Shaplin, 1964) in the 1930s was closest to the current definition of team teaching. Each teacher, who was a specialist in a group of subjects or activities, was responsible for only part of the education of a group of students. Teachers worked together as a group under the leadership of a peer supervisor. The efforts of each teacher and student group were to be related through the planning of the teacher group. Although carefully developed objectives and activities characterized the Cooperative Group Plan, it lasted only a few years (Shaplin, 1964).

In the late 1950s, team teaching once again was "discovered" as a solution to a teacher shortage. During World War II, 300,000 teachers left the profession. Following the war, reunited families produced the "baby boom" of the 1950s. These two factors led to severely overcrowded classrooms (Shaplin, 1964). Secondary school educators first suggested instructional teams as a solution. The Commission on the Experimental Study of the Utilization of Staff in the Secondary School was created in 1955 to consider alternative staffing procedures (Sanford, 1958). Members of the Commission noted that secondary school teachers spent much of their time handling clerical tasks that could be done by nonprofessionals or individuals with less preparation than would be required for certification. A few pilot projects in which teams including a teacher and paraprofessional aides or other team arrangements were used were initiated in 1956 and 1957 (Shaplin, 1964).

The team teaching concept soon spread to elementary schools (Anderson, Hagstrom, & Robinson, 1960). It was during this period of time that the use of teams to provide instruction became known as team teaching. Advantages in addition to effective use of staff were cited by authorities such as Alexander (1971), who stated that "the instructional team approach to learning experiences makes it possible for increased personalized learning [to occur]" (p. 102). Soon, whole schools featuring open-space or barrier-free architectural plans were built to support team teaching (Blair & Woodward, 1964).

Forms of Teaming to Teach

By far the most frequently described type of team teaching in the literature is the multiple-teacher team. Teams involving a teacher and another member of the classroom microsystem, a member of a related extended microsystem, and/or a member of an associated exosystem are mentioned less frequently.

Teams composed of teachers. Multiple-teacher teams include two or more teachers. Some authors have restricted their definitions of team teaching to include only multiple-teacher teams. Schmuck, Paddock, and Packard (1969) stated that "team teaching occurs when two or more teachers have responsibility for the same students in the same subject at, or about, the same time" (p. 22). Shaplin (1965) defined team teaching as "a type of instructional organization, involving teaching personnel and the students assigned to them, in which two or more teachers are given responsibility, working together, for all or a significant part of the instruction of the same group of students" (p. 16). Singer (1964) also stated that team teaching involves "two or more teachers, with or without teacher aides, [who] cooperatively plan, instruct, and evaluate one or more class groups" (p. 16). The authors of these definitions implied that insofar as team teaching is concerned, teams consist of persons on equal professional levels and in the same or similar roles, perhaps assisted by paraprofessionals, who share equal or nearly equal reponsibility for instruction. It is this type of team, almost invariably, that has been chosen for evaluation when studies of team teaching have been conducted.

Teams composed of teachers and nonteachers. The literature contains many fewer references to teaching teams comprising a teacher and one or more other persons who are not teachers or teacher aides. Anderson et al. (1960), who described team teaching as "an arrangement in which two, three, or more adults combine their energies and talents to instruct a larger number of pupils than the usual 25 to 30" (pp. 62-63), restricted team membership to adults. Goodlad (1965) provided a definition of cooperative teaching, which he considered a form of team teaching:

> Cooperative teaching is . . . a process wherein two or more persons, . . . not necessarily of the same professional status, share in the planning of any segment or, conceivably, all of the learning opportunities for a specified group of students in carrying out their joint plans. (p. 11)

Although Goodlad did not restrict membership of the teaching team specifically to adults, the phrase "not necessarily of the same professional status" suggests that he may have thought such a limitation was assumed.

Authors rarely have included all possible participants as potential team members. However, Johnson and Hunt (1968) defined team teaching as the "direction of learning activities by a coalition of persons. It is the guidance of students in learning experiences by two or more associated persons" (p. 1). Included among the possible team members listed by Johnson and Hunt were team leader, master teacher, teacher specialist, auxiliary personnel, paraprofessional, instruction assistant, intern, secretary, team clerk, teacher aide, community consultant, student consultant, resource professional, and support personnel. Often, involving the use of nonteachers in the

classroom is not called team teaching. For example, in a study of the use of community resource personnel in Nashville, Tennessee, classrooms, this involvement was called "lay participation" (Adkisson, 1961).

Evaluations of Team Teaching

Evaluations of team teaching have been focused on many aspects, including students' cognitive and affective outcomes, teachers' reactions to the procedure, behavioral mapping such as mapping of traffic patterns in team versus traditional settings, and administrative structures in team-oriented schools. Only those studies that are related to student outcomes are of direct relevance to the current study.

Studies of students' affective outcomes. Advocates of team teaching often have stated that students educated by teams develop more positive affective characteristics than students educated in traditional classrooms (Johnson & Hunt, 1968; Nystrand & Bertolact, 1964; Trump, 1965; Zweibelson, 1967). Early critics of team teaching, on the other hand, often predicted difficulty of students' adjustment to multiple-teacher teams and large class groups. To test this question, evaluations of team teaching often have been planned to include one or more student affective outcome variables, such as students' adjustment, motivation, attitude toward school and teachers, and/or dependence/independence.

In many studies, assessment of adjustment has been subjective (Joyce, 1967). Reports in the literature often were descriptive,

providing, as Jefferies, Kauffman, Pomilio, and Worth (1966) did, a glowing picture of team instruction without data related to students' or teachers' outcomes. The Franklin School in Lexington, Massachusetts, was the first elementary school in the country to be organized on a totally team taught basis in 1957 (Anderson et al., 1960). In a report of the first year's impressions, it was simply reported that the students "were in no way confused or caused to be emotionally disturbed by the new program. . . . It seems altogether justified . . . to claim that pupil enthusiasm has increased" (School and University Program for Research and Development, cited in Blair & Woodward, 1964).

More objective measures were used as the concept of team teaching became more established. Lambert, Goodwin, and Wiersma (1965) used structured classroom observation in a study of classroom disciplinary problems. Observing both team taught and traditionally taught classrooms, they determined that elementary school students had few adjustment problems in either situation in the schools included in the study. In a second study, Lambert, Goodwin, Roberts, and Wiersma (1965) administered the California Test of Personality as a pre- and posttest measure of adjustment of students in traditionally taught and team taught elementary school classrooms. Students in the traditionally taught classroom showed a greater gain in the personal adjustment subtest of the instrument. However, many studies were flawed by confounding teaming instruction with open-space classroom arrangement (Burchyett, 1973; Dougherty, 1979; Jackson, 1964; Jefferies et al., 1966; Lambert, Goodwin, Roberts, & Wiersma, 1965; Lambert, Goodwin, & Wiersma, 1965; Salmon, 1972).

Researchers have studied other issues that may be components of the student's total adjustment. For example, greater mobility within the classroom was cited by Jackson (1964) as a factor in students' tendency to establish fewer close relationships and to develop less social compatability than comparable students in a traditionally taught classroom. Jackson also noted that the isolated and maladjusted students in the study tended to "suffer increased disequilibrium" (p. 326), thus functioning even less effectively as social beings.

In addition, students' characteristics compared in team taught and traditionally taught classrooms have included such things as creative thinking (Burchyett, 1973); attitudes toward school and motivation (Burchyett, 1973; Gamsky, 1970); and attitudes toward others, respect for the opinions of others, and sense of personal freedom (Gamsky, 1970). Team taught students generally have shown better attitudes toward school and teachers, greater motivation, and greater interest in the subject matter. However, investigators seldom have used the same inventory or assessment from study to study and have used unstandardized instruments or have not presented reliability and/or validity information in their dissemination of results.

Studies of students' knowledge outcomes. Early studies of team teaching seldom included measures of students' knowledge outcomes. When such data were presented, comparison data from traditionally taught classrooms generally were not included. When, in the mid- to

late 1960s, researchers began to study knowledge outcomes, it became evident that the influence of team teaching on knowledge outcomes was not greatly different from the influence of traditional teaching (Blair & Woodward, 1964; Heathers, 1964). Gamsky (1970) studied 145 high school freshmen, half or whom received team instruction in English and social studies, and half of whom were taught in traditional classrooms. Students' achievement was measured by a 100-item multiple-choice teacher-constructed test in each subject. No differences were observed on gain scores between team taught and traditionally taught students.

Heathers (1964) and Lambert, Goodwin, Roberts, and Wiersma (1965) reported results of early team teaching studies in Colorado and Connecticut. In one study, in which the effects of the treatment were mixed, 1,500 Colorado high school students were assigned randomly to team taught and traditionally taught classrooms in English, math, science, history, and typing. Assessment scores on the Iowa Test of Educational Development were better for team taught students in English III and better for traditionally taught students in English II (Heathers, 1964). In Connecticut, seven team taught classrooms of 75-90 students each (grades 1-6) were matched by grade and IQ with traditionally taught classrooms. Evaluations of student achievement were better for the traditionally taught students on 56% of the comparisons. Lambert, Goodwin, Roberts, and Wiersma (1965) randomly assigned students to a treatment (team taught) or control (traditionally taught) classroom at the primary and the intermediate level.

Although the primary level team taught classroom out-performed the traditionally taught primary classroom, the reverse was true at the intermediate level.

Nutrition Education

The inclusion of nutrition education in elementary school curricula is fairly recent. Evaluations of nutrition education are even more recent in origin. A review of the historical development of nutrition education and its evaluation in this country is included to provide an example of a subject area in which teaming to teach might be evaluated.

Historical Perspective

Although many of the discoveries underlying the discipline of nutrition occurred in the 19th century, it was not until the beginning of World War I and the ensuing shortages of foodstuffs that the need for nutrition education became particularly evident (Darby, 1976; Todhunter, 1976). At first, nutrition educators thought that the provision of correct knowledge would be sufficient to produce appropriate nutrition-related behaviors (Levy, Iverson, & Walberg, 1980). In fact, until the late 1960s and early 1970s, measures of nutrition-related behaviors seldom were included in studies of nutrition education (Levy et al., 1980). Typically, the nutrition educator has attempted to provide instruction that will be a "bridge between the findings of nutrition research and the acceptance and application by recipients and users of the information" (Martin & Beal, 1977, p. 249).

One of the first large-scale attempts to provide nutrition education to school-age children occurred as part of the National School Lunch Program. Established by an act of Congress in 1946, the National School Lunch Program had as its primary purpose the immediate improvement of child nutritional status; a strong secondary purpose was the introduction to children of different foods and food preparation styles in hopes that the children would learn to accept them (Gifft et al., 1972; Mack, 1947).

In the subsequent decades, nutrition educators began to draw on the work of other researchers, such as Margaret Mead, as a basis for conducting their own sociocultural food behavior studies (Birch, 1980; Birch, Zimmerman, & Hind, 1981; Burt & Hertzler, 1978; Sanjur, 1970). Soon, curricula were developed taking into account the cultural and social characteristics of the targeted students. Advances that were occurring in education and developmental levels of specific age groups--for example, primary school-aged children (Beyer & Morris, 1974; Contento, 1981); second-graders (Lovett, Barker, & Marcus, 1970); third-graders (Smith & Justice, 1979); intermediate school-age children (Baker, 1972; Bell & Lamb, 1973; Cosper, Hayslip, & Foree, 1977); middle school-age children (George, 1971); secondary school-age children (Picardi & Pariser, 1975; Picardi & Porter, 1976); and multiple age groups (Head, 1974)--and/or the use of innovative teaching methods (Barker & Barker, 1977; Kofacker & Brenner, 1976; Lowenberg, 1978) also were integrated into the growing body of nutrition education literature. In 1969, Todhunter described nutrition education

as the process through which attitudes, understandings, and beliefs about food and related economic and environmental factors are translated into food habits that are both nutritionally sound and practical. The efforts of many nutrition educators had been expended to bring the field to this point; just as important were the evaluations conducted to assess the value of these approaches.

Evaluations of Elementary School Nutrition Education Programs

Although nutrition education is a relatively new field, the evaluation of nutrition education is even newer (Talmadge, Hughes, & Eash, 1978). Problems exist with precision of measurement in the assessment of nutrition-related attitudes and behavior (St. Pierre, Note 4) and lack of comprehensive theoretical and conceptual frameworks (Petersen & Kies, 1972), not to mention that it is difficult even to get people to agree on the purposes and desired ends of nutrition education. Even so, the research design and scope of evaluation in nutrition education have become more sophisticated since the late 1960s.

Elementary school educators and nutrition experts have investigated the effects of many approaches to nutrition education with children at various grade levels over the past few years. Basic to nutrition education programs reported in the literature has been the presentation of correct nutrition-related information to the targeted students; however, the mode of presentation has taken many forms.

In some nutrition education units described in the literature, the teacher has concentrated on a lecture and text method of presentation. For example, Bell and Lamb (1973) assessed the effects of

a 6-week unit with approximately 1,500 fifth-grade students in 33 schools in five states. One classroom in each school received the nutrition education unit, one received a placebo in place of the nutrition unit, and one received no treatment. The treatment group was better than the comparisons on posttreatment knowledge scores but not on a measure of nutrition-related behavior (weight and/or measurement of milk and vegetable waste).

Other researchers have used experiences with animal feeding as a part of nutrition units. In a study of the effects of nutrition education on fourth- and fifth-graders, Baker (1972) assigned approximately 200 students by classroom to experimental or control status. The treatment groups participated in a 2-week nutrition education unit in which the students performed laboratory and mechanical tests on food and food by-products, evaluated their own diets, recorded their levels of activity, tasted an unfamiliar food, and observed weanling rats fed adequate and inadequate diets. The treatment group achieved superior performance on a test of nutrition knowledge but failed to show superiority on measures of nutrition-related practices (dietary recalls and records) or vegetable preference tests. Roth (Note 2) compared the integration of rat feeding into a nutrition unit for over 1,000 fifth- through eighth-grade students with traditional classroom instruction received by over 400 comparison students. The students who observed rats fed adequate and inadequate diets showed gains in both nutrition knowledge and adequate food choice.

Integration of some aspects of the food service program into the instructional process has been used as a component of nutrition

education programs (Boysen & Ahrens, 1972; Clark & Fisher, 1975; Garrett & Vaden, 1978; Goumas, 1972). A contest between teams within a second-grade classroom was used by Boysen and Ahrens (1972) to increase lunch-time vegetable consumption. The 30 students in the treatment classroom also participated in tasting parties and other food-use activities. The treatment group students were superior on a posttest of nutrition knowledge and showed some improvement in observed food-related practices. Clark and Fisher (1975) used a token economy with-out concurrent nutrition instruction to increase consumption of foods served in the school cafeteria. Plate waste decreased during the study, which did not include a test of nutrition knowledge.

Various media have been used to present nutrition education. Two of the most popular media are film and television. Jenkins, Strum, and Voichick (1975) assessed the effects of the "Mulligan Stew" film series with fourth graders. The treatment classes performed better on a test of nutrition knowledge than the comparison class but were not superior on the dietary recall. Public service announcements (PSAs) on commercial television were evaluated by Montandon (1974). The parents of the Texas elementary school students who were targets of PSAs reported that their children showed improved eating habits.

In recognition of the need for specialized curricula for culturally different students, Wang and Dwyer (1975) worked with Chinese-American students; they presented the Mulligan Stew films to fifth-graders, whereas fourth-graders received 6 hours of supplemental culturally appropriate instruction, and a group of fourth- and fifth-grade students received 30 minutes of bilingual classroom nutrition

education instruction weekly for 6 weeks. The groups receiving culturally appropriate instruction and bilingual instruction out-scored the comparison group on measures of nutrition knowledge.

In addition to variations in curricular material and media of presentation, variations in the type of individual presenting the material were assessed by Shoup (1975), who used teenagers to teach nutrition education. Boone and White (1976) not only used nontraditional teachers (Extension Service personnel) but also varied the setting by taking groups of 8- to 12-year-olds into field settings to study nutrition education. The effects of this nontraditional approach were compared with the effects of a traditional classroom approach. The nontraditional approach was more successful in increasing appropriate nutrition-related practices and knowledge, although the comparison (traditional) group also showed improvements in nutrition knowledge.

The use of a team approach in the planning and/or implementation of nutrition education programs also has been tried, but it has not been evaluated as a variable apart from the curriculum (DeZeeuw, 1978; King, 1979; Lee, Watson, Price, Covington, & Davis, 1978; McGovern, 1975; Santos, 1975). The Tennessee Educates for Nutrition Now (TENN) instructional plan, originally developed for use with students in kindergarten through the sixth grade, had as an integral part an emphasis on teaching teams including teachers, food service personnel, and parents (Banta, Clark, Crowley, Cunningham, Jozwiak, McCabe, Peccolo, Roberson, & Skinner, 1980; Banta, Cunningham, & Jozwiak, 1982; Banta, McCabe, Bittle, Cunningham, Freeman, Jozwiak, Peccolo,

Roberson, & Skinner, 1981). This plan was developed as a part of the Tennessee Nutrition Education and Training (NET) Program and was evaluated in statewide assessments for 3 years. Gains occurred in students' nutrition-related knowledge and attitudes for most grade levels in each year of the study. Students' nutrition-related practices were not affected consistently. No attempt was made in these statewide assessments to evaluate the relationships between the use of teaching teams and students' outcomes.

Summary and Conclusions

Many advantages have been claimed for the team approach to problem solving (e.g., gains in efficiency, greater range of experience among members, support, peer supervision). Possible disadvantages of a team approach include such things as the problem of insularity among members resulting in insensitivity to external reality and overly large solutions to problems that did not need a team approach.

One area in which the team approach has been used extensively in the past few years is education. Evaluations of team teaching were numerous from the early 1960s to the early 1970s. The majority of evaluations were conducted using a definition of teaming in which team membership was restricted to professional teachers occasionally assisted by teacher aides. Many studies were flawed methodologically because of small samples, lack of adequate controls, confounding of team instruction with open-space architectural design, or other shortcomings. However, two generalizations may be drawn concerning the results of these evaluations: Students' affective outcomes (e.g.,

attitudes toward school and teachers, sense of personal freedom) have been the variables most likely to be affected by team teaching, and knowledge outcomes generally have not been different between team taught and traditionally taught classrooms. Few studies of team teaching have been published since the mid-1970s. The literature has included few studies with large samples drawn across a large geographic area and across several grades or that are based on a definition of team teaching in which team membership included persons other than teachers or teacher aides.

Nutrition education also is a fairly recent development in American education. Stimulated by concern over the level of nutrition knowledge and associated practices in American during the food shortages caused by World War II, educators and nutrition experts joined forces to develop curricula to provide nutrition education. The school was chosen as the most accessible place for nutrition education with children to take place. At first, all nutrition education was didactic in nature, comprising presentations of correct nutrition information by a teacher.

The evaluation of nutrition education is even more recent in origin. The first evaluations of nutrition education were limited to measures of nutrition knowledge, but researchers soon borrowed from social scientists, adding measures of nutrition attitudes and practices. Although a didactic presentation of correct information about nutrition often has resulted in changes in levels of nutrition knowledge, researchers found that changes in attitudes and behaviors have been much smaller--or nonexistent. The curricula most likely to

result in changes in attitudes have been those that included active involvement of the student (e.g., conducting laboratory tests on foods, observing rats fed different diets), whereas studies in which changes in practices occurred usually included some type of positive reinforcement of desired practices. However, most studies have been planned to include small samples or samples limited to one or two grades in a single geographic area. Different methods of instructional delivery, such as team teaching, also have been attempted, but these delivery methods usually have not been evaluated as variables.

Nutrition, because it is a multifaceted subject affecting many components of an individual's life, is particularly adaptable to a team taught delivery. In fact, use of multiple instructors, multiple settings for instruction, and different times for presentation of materials increases the likelihood that changes achieved in nutrition-related knowledge, attitudes, and practices will generalize across individuals, settings, and time. Therefore, the potential value of an evaluation of teaming to teach approach is apparent, including the evaluation of the different types of persons who can be involved (e.g., parents, food service personnel, media specialists); the different types of instructional components in which involvement can occur (e.g., planning activities, developing materials, conducting activities); and the degree to which involvement can occur for individuals and instructional components.

CHAPTER III

METHODOLOGY

This study of the relationship of teaming to teach to students' academic outcomes in nutrition education was conducted in conjunction with a larger evaluation of nutrition education. The Tennessee Nutrition Education and Training (NET) Program, operated through the Tennessee Department of Education, was initiated in 1979. The students' data used in the present study were obtained in the spring, 1982, assessment phase of the Tennessee NET evaluation.

Hypotheses

The present study was conducted to determine whether relationships exist between teaming to teach nutrition education and students' nutrition-related outcomes. Specifically, it was hypothesized that students' nutrition-related knowledge, attitudes, and practices could be predicted on the basis of the specific types of teaming to teach, including (a) the degree of involvement--individuals, (b) the degree of involvement--instructional components, and (c) the composite assessment of teaming (i.e., the number of individuals who team, the number of instructional components in which teaming occurs, and the extent of teaming).

Sample

This study was based on data from students and teachers who participated in the Tennessee NET evaluation conducted in 1982. The target populations were elementary school students and teachers.

Sample Selection

Initially, 11 school districts were chosen from among those in which small grants had been awarded to help with implementation of the TENN Instructional Plan. The eleven school districts were chosen on the bases of representativeness (i.e., geographic distribution throughout the state, urban and rural populations, relative population density); not having participated in previous years' evaluation studies; and willingness of district-level personnel to participate in the assessment. Although 11 school districts participated in the larger study, the district-level administration in one school district chose not to participate in the in the teaming to teach nutrition study.

Next, one school in which the TENN Instructional Plan had been implemented and one in which it had not were chosen from each district. As with the choice of school districts, representativeness and willingness to participate were factors in the choice of schools to participate in the assessment.

Finally, a classroom at each grade level was chosen from each of these schools. In very small schools, the choice of classrooms was automatic because only one classroom existed at each level, or, in some cases, grades were combined and distributed among three or four teachers for the whole school. In the larger schools, the choice of classrooms was left to the principal of the school.

The sample of teachers for the teaming to teach nutrition study consisted of those teachers in all participating schools who returned questionnaires. The student sample consisted of students in these

teachers' classrooms who were assessed in the spring, 1982, NET assessment.

Sample Characteristics

The final sample of teachers included 67 females and 4 males in 18 schools. Grades taught by participating teachers are presented in Table 3-1. The student sample included 824 females, 831 males, and 6 students who did not record gender in the same 18 schools. The gender and grade composition of the student sample is presented in Table 3-2.

Measurement

Data collection for the current study was accomplished through administration of questionnaires. Instrumentation, procedures, and data reduction for the sample of teachers and the sample of students differed in several respects.

Instrumentation

The Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices (CANKAP) was used to collect data from students. Data were collected from teachers using the Teaming to Teach Nutrition Questionnaire (TTNQ).

Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices.

The CANKAP was developed by a multidisciplinary team with expertise in nutrition, child development, and early childhood education (Cunningham, Skinner, Cagle, Miller, & Teets, 1981) as a part of a larger instrument, the Assessment of Nutrition Knowledge, Attitudes, and Practices and Perceptions of Nutrition Perceptions (cited in

Table 3-1

Participating Teachers by Grade

Grade	Number of teachers
Kindergarten	10
First	9
First/second	1
Second	10
Third	10
Third/fourth	2
Fourth	12
Fifth	9
Fifth/sixth	1
Sixth	7
Total	71

Table 3-2

Distribution of Students by Gender and Grade

Gender	Grade							Total
	K	1	2	3	4	5	6	
Female	138	115	95	105	152	127	92	824
Male	143	101	104	103	174	123	83	831
Not recorded	1	0	0	2	1	0	2	6
Total	282	216	199	207	327	250	177	1,661

Note. Six students failed to indicate gender.

Banta et al., 1981). The team assembled a pool of items designed to measure success in meeting goals and objectives from a framework for nutrition education (Skinner, Cagle, Cunningham, Miller, & Teets, Note 3). Of the 11 forms of the CANKAP, 3 were used in the current study: Form 9 (kindergarten and grade 1), Form 8 (grades 2 and 3), and Form 7 (grades 4 through 6). All three forms include 20 knowledge items in a 4-response multiple-choice response format. The attitudes and practices items were set up in a Likert-type response format in which the number of points on the scale was varied according to the developmental level of the intended respondent group (i.e., 2-point scales on Form 9, 3-point scales on Form 8, and 4-point scales on Form 7). Form 7 included 10 attitude and 10 practice items, whereas Forms 8 and 9 included 5 attitude and 5 practice items. Copies of the revised Forms 7, 8, and 9 of the total instrument used in the assessment are included in Appendix A.

After an initial screening of the item pool, a core group of items was selected to be pilot tested with 878 students who attended schools in rural and urban areas representing varied sociodemographic characteristics. Changes in item format and content were made on the basis of pilot participants' suggestions. Items that contributed the most to instrument reliability or were considered essential to the content validity for measurement of the goals and objectives were included in the final form of the instrument, which could be administered in 30 to 40 minutes. The CANKAP was used in statewide assessments in 1980 and 1981; after each administration, changes were made

in some items to improve clarity and to accommodate revisions in the goals and objectives framework.

Instrument reliability for the CANKAP was determined with Cronbach's alpha test for all scales; results for the 1982 assessments are presented in Table 3-3. Content validity of the original form was determined by a group of 99 specialists with expertise in human development, education, nutrition, and/or food science; validity matrices were constructed showing item distribution by goal and objective in relation to grade level (Cunningham et al., 1981).

Teaming to Teach Nutrition Questionnaire. The TTNQ was developed to measure the degree and extent of teaming to teach that occurs in the provision of nutrition education. The instrument is composed of nine scales representing types of individuals who may team to teach nutrition and an "other" category (a total of 10 scales). Each scale is made up of seven items representing six types of instructional components and an "other" category. The items are based on a 5-point Likert-type response format that ranges from "never" (0% of the time) to "always" (100% of the time). Respondents are asked to circle a number for each item to indicate the degree to which they involved the type of individual named in the scale in the activity named in the item. A copy of the TTNQ is included in Appendix A.

Pilot testing of the TTNQ was accomplished in two stages. The questionnaire first was completed by 16 primary and elementary school teachers in Knox County, Tennessee. After adjustments were made on the basis of comments from these teachers, the instrument was mailed

Table 3-3

Cronbach's Aloha Reliability Coefficients for the
Comprehensive Assessment of Nutrition Knowledge, Attitudes, and Practices

Test group	n	Scales					
		Knowledge		Attitudes		Practices	
		No. of items	Cronbach's alpha (standardized)	No. of items	Cronbach's alpha (standardized)	No. of items	Cronbach's alpha (standardized)
Grades K-1	877	20	.71	5	-.22	5	-.23
Grades 2-3	958	20	.57	5	.29	5	.09
Grades 4-6	1,491	20	.75	10	.39	10	.47

to 132 teachers throughout the state of Tennessee. On the basis of misinterpretations and comments made by the 102 teachers who responded to this mailing, revisions were made in the instrument to make it easier to understand and complete. A copy of the TTNQ is included in Appendix A.

Face and content validity of the TTNQ were determined by a panel of educators. The 16 members of the panel had expertise in the areas of early childhood education, child development, nutrition education, special education, and educational psychology. Reliability was determined with a test-retest procedure, involving 30 primary and elementary school teachers from Knox County, Tennessee, schools who completed the instrument twice at a 2-week interval. The two sets of scores were analyzed using the Pearson's *r* correlational procedure, which resulted in reliability coefficients ranging from .94 to .99. These correlations are presented in Table 3-4.

Procedures

The CANKAP was administered by school district personnel in April and May, 1982. The school district project directors or their representatives were trained in a 2-hour session prior to administration, at which time all test materials and an administration manual were distributed. Personnel were encouraged to contact the researcher prior to data collection if they needed additional information. A cover letter attached to the CANKAP contained an explanation of the study, description of potential risks to the participants, and assurance of confidentiality of response. These letters were written on an

Table 3-4

Test-Retest Reliability Coefficients for the Teaming to Teach Nutrition Questionnaire

Scale	r
Types of individuals	
Use of nutrition experts	.99
Use of school food service personnel	.99
Use of other teachers	.99
Use of building-level administrators	.98
Use of system-level supervisors	.99
Use of media specialists or librarians	.99
Use of school support staff	.86
Use of students	.96
Use of parents	.96
Use of other community resource persons	.96
Types of instructional components	
Developing goals/activities	.92
Providing background information	.98
Developing materials	.99
Planning activities	.97
Conducting activities	.99
Evaluating activities and programs	.97
Other activities	.99

Note. $n = 71$.

appropriate developmental level for the intended repondents. Completion of the CANKAP was considered agreement to participate in the study. The cover letters are included in Appendix B.

The TTNQ was administered by mail. The questionnaire initially was mailed on May 1, 1982, to 119 teachers whose students had been assessed in April and May using the CANKAP. Teachers were informed in a cover letter of the purpose of the study, the potential risk to participants, and the assurance of confidentiality of response. Completion and return of the TTNQ were considered agreement to participate in the study. The cover letter is included in Appendix B. Follow-up questionnaires were mailed on May 15 to teachers who had not responded to the initial mailing. Responses were received from 66 teachers following the initial mailing. Of the 97 responses received in both mailings, 71 were usable. Unusable questionnaires included those on which the teachers had failed to provide name or school and reponses from one school in which two classes from each grade were tested, preventing the researcher from being able to associate student scores with teacher responses on the TTNQ. Nonrespondents were contacted by letter to determine the reasons for nonresponse. Responses to the letters were received from 12 teachers; 9 of these teachers reported that they were too busy to complete the questionnaire, and 3 reported that they had forgotten about it.

Operational Definitions

A student's nutrition-related knowledge was measured by adding the number of correct responses on the 20-item knowledge component of

the CANKAP, resulting in a score of 0 to 20. The student's score on the attitudes and practices components of the CANKAP was measured by computing the average across items for each scale; a student's scores on the attitudes and practices variables could range from 1 to 2 on Form 9, from 1 to 3 on Form 8, and from 1 to 4 on Form 7. Students who answered fewer than 5 items on the CANKAP (less than 1% of the total sample) were removed from the study. Corrections were made on the computer data tape for school code and grade for two classrooms.

The specific types of involvement in teaming to teach were measured through two variables: The degree of involvement--individuals was measured by adding the values marked for a given type of individual across all types of instructional components and dividing by the number of items marked for a total of 10 scores (one for each type of individual), each ranging from 1 to 5. The degree of involvement--instructional components was measured by computing average scores for each teacher by adding the values marked for a given instructional component for all 10 types of individuals and dividing by the number of items marked for a total of 7 scores (one for each type of instructional component), each ranging from 1 to 5.

The composite assessment of teaming included three components: The number of types of individuals who team to teach was measured by counting the number of different types of individuals who were marked on the TTNQ as having any degree of involvement in any type of instructional component, resulting in a score from 0 to 10 for each teacher. The number of types of instructional components in which teaming to teach occurs was measured by counting the number of instructional

components that were marked at any level above the first continuum point ("never; 0% of the time") on any scale, resulting in a score of 0 to 7 for each teacher. An aggregate score (the extent of teaming to teach) was measured by computing an arithmetic mean of all 70 items, resulting in a single score from 1 to 5 for each teacher.

The only data omitted by teachers were identifying data. Because instruments from those teachers could not be matched with classrooms, those responses were eliminated.

Plan of Analysis

Students in grades 1 through 6 responded to the CANKAP on an optical scan form that then was processed through an optical scan form reader and the data transferred to computer tape storage. Students in kindergarten through grade 3 recorded their answers to the CANKAP directly on the instrument forms; their responses then were keypunched from these forms. The TTNQ was constructed to allow computer entry of data directly from the instrument. Attitude and practice scores from the CANKAP were standardized across forms to a common metric basis for all forms.

Data from both instruments were tested for multicollinearity by Pearson's product-moment correlation. Descriptive statistics were computed for students' and teachers' variables.

In addition to descriptive measures, nine multiple regression were computed using the Statistical Analysis System (SAS) (Sarle & Goodnight, 1982) to determine whether prediction of students' nutrition-related knowledge, attitudes, and practices could be made from

specific types of involvement in teaming to teach (i.e., the degree of involvement--type of individuals and the degree of involvement--instructional components) and the composite assessment of teaming. The classroom was used as the unit of analysis. A .05 criterion for significance was used, and a contribution of .02 to the $\underline{R}^2$ was required for each consecutive variable entering a model. Although the wise alpha level, the criterion was selected because of the untried nature of the TTNQ.

CHAPTER IV

RESULTS

The research hypotheses were tested using regression analyses. Item intercorrelations were used to investigate the potential multicollinearity among the variables. Measures of central tendency and variability were computed to provide a better understanding of the distribution for each variable.

Intercorrelation Among Variables

Pearson product-moment correlation coefficients were calculated among all the predictor variables. The intercorrelations are presented in Tables 4-1, 4-2, and 4-3. High intercorrelations (.90 and higher) occurred for all but one level of the variable degree of involvement--instructional components. Further investigation of the multicollinearity was undertaken by regressing each level against all others as suggested by Lewis-Beck (1980). The R^2 values for these regressions approached 1.00, confirming the high degree of mulitiicollinearity. Because variables that are intercorrelated at such a high level cannot be used with any degree of reliability for prediction in a regression model, the categories of the degree of involvement--instructional components were collapsed to result in a grand mean of all degree of involvement--instructional components scores. The collapsed variable then was regressed against the criterion variables. No multicollinearity existed for degree of involvement--individuals or the composite assessment of teaming to teach.

Table 4-1

Correlation Matrix for Categories of Degree of Involvement--Individuals

Variables	NUTEXP[a]	FDSVCP[b]	OTHTCH[c]	BLDGAD[d]	SYSLVS[e]	MEDSPE[f]	OTHSSS[g]	STUDNTS[h]	PARENTS[i]	OTHERS[j]
NUTEXP[a]	1.00 .0001									
FDSVCP[b]	.52 .0001	1.00 .0001								
OTHTCH[c]	.49 .0001	.7 .0001	1.00 .0001							
BLDGAD[d]	.49 .0001	.6 .0001	.59 .0001	1.00 .0001						
SYSLVS[e]	.63 .0001	.55 .0001	.41 .0004	.40 .0005	1.00 .0001					
MEDSPE[f]	.50 .0001	.59 .0001	.52 .0001	.34 .004	.65 .0001	1.00 .0001				
OTHSSS[g]	.52 .0001	.53 .0001	.44 .0001	.35 .002	.66 .0001	.49 .0001	1.00 .0001			
STDNTS[h]	.46 .0001	.52 .0001	.56 .0001	.48 .0001	.28 .02	.33 .005	.28 .02	1.00 .0001		
PARENTS[i]	.48 .0001	.69 .0001	.62 .0001	.51 .0001	.61 .0001	.73 .0001	.52 .0001	.43 .0002	1.00 .0001	
OTHERS[j]	.45 .0001	.39 .0008	.28 .02	.31 .008	.66 .0001	.43 .0002	.57 .0001	.22 .07	.49 .0001	1.00 .0001

Note. $n = 71$. The first number in each entry is r and the second is p.

[a] NUTEXP = Degree of involvement for nutrition experts.

[b] FDSVCP = Degree of involvement for school food service personnel.

[c] OTHTCH = Degree of involvement for other teachers.

[d] BLDGAD = Degree of involvement for building-level administrators

[e] SYSLVS = Degree of involvement for system-level supervisors.

[f] MEDSPE = Degree of involvement for school media specialists or librarians.

[g] OTHSSS = Degree of involvement for other school support staff.

[h] STDNTS = Degree of involvement for students.

[i] PARENTS = Degree of involvement for parents.

[j] OTHERS = Degree of involvement for other community resource persons.

Table 4-2

Correlation Matrix for Categories
of Degree of Involvement--Instructional Components

Variables	GOALOBJ[a]	BACKINF[b]	PLANACT[c]	DEVMAT[d]	CONDACT[e]	EVALACT[f]	OTHACT[g]
GOALOBJ[a]	1.00 .0001						
BACKINF[b]	.93 .0001	1.00 .0001					
PLANACT[c]	.94 .0001	.93 .0001	1.00 .0001				
DEVMAT[d]	.94 .0001	.91 .0001	.96 .0001	1.00 .0001			
CONDACT[e]	.92 .0001	.90 .0001	.95 .0001	.94 .0001	1.00 .0001		
EVALACT[f]	.95 .0001	.91 .0001	.94 .0001	.93 .0001	.94 .0001	1.00 .0001	
OTHACT[g]	.38 .001	.39 .0007	.41 .0003	.40 .0006	.40 .0006	.45 .0001	1.00 .0001

Note. n = 71. The first number in each entry is r and the second is p.

[a]GOALOBJ = Degree of involvement for goals and activities.

[b]BACKINF = Degree of involvement for providing background information.

[c]PLANACT = Degree of involvement for planning activities.

[d]DEVMAT = Degree of involvement for developing materials.

[e]CONDACT = Degree of involvement for conducting activities.

[f]EVALACT = Degree of involvement for evaluating activities or programs.

[g]OTHACT = Degree of involvement in other activities.

Table 4-3

Correlation Matrix for Composite Assessment of Teaming

Variables	EXTTEAM [a]	NUMIND [b]	NUMCOM [c]
EXTTEAM [a]	1.00 .0001		
NUMIND [b]	.80 .0001	1.00 .0001	
NUMCOM [c]	.51 .0001	.69 .0001	1.00 .0001

Note. n = 71. The first number in the entry is r and the second is p.

[a] EXTTEAM = Extent of teaming to teach.

[b] NUMIND = Number of individuals who team to teach nutrition.

[c] NUMCOM = Number of activities in which teaming to teach nutrition occurs.

Regression Analyses

A stepwise regression procedure featuring a maximum R^2 improvement technique with a simple linear model was used to answer the research question of which teaming to teach variables are predictive of students' nutrition-related knowledge, attitudes, and practices. The total model and the best model for each variable were computed.

Prediction of Students' Nutrition-Related Knowledge

The best prediction model for students' nutrition-related knowledge was a four-variable model for the degree of involvement--individuals. The total model for degree of involvement--individuals was not significant. Individuals included in the best model were students, school support staff, other community resource persons, and system-level supervisors, with the contribution of system-level supervisors and school support staff being negative. The degree of involvement--instructional components (the collapsed variable) was not predictive of students' nutrition-related knowledge. In the best model for the composite assessment of teaming, one variable (i.e., the number of instructional components in which teaming to teach occurs) was predictive of students' nutrition-related knowledge. The total model for the composite assessment of teaming to teach was not significant. Results of these regressions are presented in Table 4-4.

Prediction of Students' Nutrition-Related Attitudes

The best predictor of students' nutrition-related attitudes was a five-variable model for the degree of involvement in teaming to

Table 4-4

Regression Models for Prediction of Students' Nutrition-Related Knowledge

Variables	β	SE	p
Degree of involvement--Individuals			
Total model[a]			
Nutrition experts	-.11	.32	.74
School food service personnel	.14	.41	.74
Other teachers	-.21	.32	.51
Building-level administrators	.42	.44	.34
System-level supervisors	-.91	.60	.14
School media specialists/librarians	.47	.44	.29
Other school support staff	-.59	.44	.19
Students	.44	.25	.09
Parents	.27	.52	.60
Other community resource persons	.92	.41	.03
Best model[b]			
System-level supervisors	-.68	.48	.16
Other school support staff	-.60	.41	.15
Students	.47	.20	.02
Other community resource persons	.92	.39	.02
Degree of involvement--Instructional components			
Composite degree of involvement--instructional components[c]	.25	.36	.49
Composite assessment of teaming			
Total model[d]			
Number of individuals who team to teach	.14	.18	.45
Number of instructional components in which teaming to teach occurs	.18	.13	.16
Extent of teaming	-.53	.67	.44
Best model[e]			
Number of instructional components in which teaming to teach occurs	.19	.09	.05

[a] F (10, 60) = 2.33, p = .22, R^2 = .18.

[b] F (4, 66) = 2.99, p = .02, R^2 = .15.

[c] F (1, 69) = .49, p = .49, R^2 = .01.

[d] F (3, 67) = 1.57, p =.20, R^2 = .07.

[e] F (1, 69) = 4.14, p = .05, R^2 = .06.

teach--individuals. Although the total model for degree of involvement--individuals was significant, no variables beyond the first five met the criterion of adding at least .02 to the R^2 coefficient. Individuals contributing to the best model included students, building-level administrators, system-level supervisors (negative prediction), other community resource persons, and school media specialists or librarians. Prediction of students' nutrition-related attitudes also occurred on the basis of degree of involvement--instructional components (the composite variable). Students' nutrition-related attitudes also were predicted by a two-variable model of the composite assessment of teaming. The predictors in this model were the number of individuals who team to teach nutrition and the number of instructional components in which teaming to teach occurs. Although the total model for the composite assessment of teaming was significant, the third variable did not meet the criterion of adding at least .02 to the R^2 coefficient. Results of these regressions are presented in Table 4-5.

Prediction of Students' Nutrition-Related Practices

No predictors were found for students' nutrition-related practices. No variables met the .05 criterion for entry into the models for prediction of practices by the degree of involvement--individuals; degree of involvement--instructional components; or composite assessment of teaming to teach nutrition (number of individuals who team to teach nutrition, number of instructional components in which teaming to teach occurs, or extent of teaming to teach nutrition). Results of these regressions are presented in Table 4-6.

Table 4-5

Regression Models for Prediction of Students' Nutrition-Related Attitudes

Variables	β	SE	p
Degree of involvement--Individuals			
Total model[a]			
Nutrition experts	.01	.01	.97
School food service personnel	-.004	.02	.82
Other teachers	.01	.01	.62
Building-level administrators	.03	.02	.09
System-level supervisors	-.06	.03	.02
Other school support staff	.01	.02	.79
School media specialists/librarians	.03	.02	.15
Students	.02	.01	.16
Parents	-.01	.02	.64
Other community resource persons	.05	.02	.02
Best model[b]			
Building-level administrators	.03	.02	.05
System-level supervisors	-.07	.02	.01
School media specialists/librarians	.03	.02	.12
Students	.02	.01	.10
Other community resource persons	.04	.02	.02
Degree of involvement--Instructional components			
Composite degree of involvement--instructional components[c]	.05	.02	.01
Composite assessment of teaming			
Total model[d]			
Number of individuals who team to teach	.01	.01	.57
Number of iunstructional components in which teaming occurs	.01	.01	.28
Extent of teaming	.01	.03	.66
Best model[e]			
Number of individuals who team to teach	.01	.01	.11
Number of instructional components in which teaming occurs	.01	.01	.25

[a] F (10, 60) = 2.33, p = .02, R^2 = .28.

[b] F (5, 65) = 4.88, p = .001, R^2 = .27.

[c] F (1, 69) = 7.89, p = .01, R^2 = .10.

[d] F (3, 67) = 4.22, p = .01, R^2 = .16.

[e] F (2, 68) = 6.31, p = .003, R^2 = .16.

Table 4-6

Regression Models for Prediction of Students' Nutrition-Related Practices

Variables	β	SE	p
Degree of involvement--Individuals			
Total model[a]			
Nutrition experts	-.02	.04	.55
School food service personnel	.01	.05	.83
Other teachers	.01	.04	.86
Building-level administrators	.06	.05	.27
System-level supervisors	-.07	.07	.32
School media specialists/librarians	.004	.05	.94
Other school support staff	-.03	.05	.50
Students	-.02	.03	.39
Parents	.03	.06	.57
Other community resource persons	.06	.05	.17
Degree of involvement--Instructional components			
Composite degree of involvement--instructional components[b]	.01	.04	.79
Composite assessment of teaming			
Total model[c]			
Number of individuals who team to teach	.02	.02	.29
Number of instructional components in which teaming occurs	.01	.01	.57
Extent of teaming to teach	-.07	.07	.33

[a] F (10, 60) = .61, p = .80, R^2 = .09.

[b] F (1, 69) = .07, p = .79, R^2 = .001.

[c] F (3, 67) = .75, p = .53, R^2 = .03.

Descriptive Statistics

Descriptive statistics were computed to determine the central tendency and variability of the variables in the study. Means, standard deviations, modes, and ranges for the predictor variables are presented in Table 4-7 and for the criterion variables in Table 4-8. These descriptive statistics also are presented for each item on the TTNQ in Appendix B. The mean degree of involvement--individuals was highest for students (2.55 ± 1.07) and lowest for system-level supervisors (1.20 ± .64) and other community resource persons (1.23 ± .71). The means of degree of involvement--instructional components fell within .2 of one another (1.55 ± .67 - 1.69 ± .72) with the exception of the involvement of other activities, which was considerably lower (1.06 ± .26).

Summary

It was possible to reject the null hypotheses that (a) students' nutrition-related knowledge and attitudes could not be predicted on the basis of degree of involvement--individuals and the composite assessment of teaming to teach and that (b) students' nutrition-related attitudes could not be predicted on the basis of the degree of involvement--instructional components (the collapsed variable). It was not possible to reject the null hypothesis that students' nutrition-related practices could not be predicted on the basis of teaming to teach variables.

The results of this study imply support for the substantive hypotheses that categories of the degree of involvement--individuals and

Table 4-7

Means, Standard Deviations, and Ranges for Teachers' Variables

Variable	Mean	Standard deviation	Range
Degree of involvement--Individuals[a]:			
Nutrition experts	1.53	.93	1.00-4.70
School food service personnel	1.64	.86	1.00-4.10
Other teachers	1.81	1.06	1.00-4.30
Building-level administrators	1.31	.66	1.00-3.60
System-level supervisors	1.20	.64	1.00-4.40
School media specialists/ librarians	1.57	.77	1.00-4.40
School support staff	1.25	.69	1.00-4.40
Students	2.55	1.07	1.00-4.40
Parents	1.43	.70	1.00-4.40
Other community resource persons	1.23	.71	1.00-4.40
Degree of involvement--Instructional components[a]:			
Developing goals and objectives	1.55	.67	1.00-4.20
Providing background information	1.69	.72	1.00-4.40
Planning activities	1.67	.71	1.00-4.50
Developing materials	1.65	.70	1.00-4.40
Conducting activities	1.69	.69	1.00-4.20
Evaluating activities	1.55	.67	1.00-4.30
Other activities	1.06	.26	1.00-2.80
Composite assessment of teaming:			
Number of individuals involved in teaming to teach nutrition[b]	3.93	2.86	0-10.0
Number of instructional components in which teaming to teach occurs[c]	4.86	2.29	0-7
Extent of teaming to teach[d]	1.55	.59	1.0-4.1

Note. $n = 71$.

[a]Potential range for each category was 1 ("never") to 5 ("always").

[b]Potential range was 0 to 10.

[c]Potential range was 0 to 7.

[d]Potential range was 1 (low) to 5 (high).

Table 4-8

Means, Standard Deviations, and Ranges for Students' Variables

Variables	Mean	Standard deviation	Range
Knowledge[a]	12.15	1.79	9-17
Attitudes[b]	1.68	.09	1.5-1.9
Practices[b]	1.51	.19	1.2-1.9

Note. n = 1,661.

[a]Potential score range was 0 (none correct) to 20 (all correct).

[b]Potential score range transformation to a common metric base across forms was 1 (low) to 4 (high).

the degree of involvement--instructional components are predictive of students' nutrition-related knowledge and attitudes and that two categories of the composite assessment of teaming to teach (the number of instructional components in which teaming to teach occurs and the number of individuals who team to teach) are predictive of students' nutrition-related attitudes. In more than 65% of the best models for the multiple regression analyses, the predictor variables were significant at or below the .10 level. No predictors were found for students' nutrition-related practices.

CHAPTER V

CONCLUSIONS

Teaming to teach was supported in the current study as a useful instructional procedure. Although the study was limited by design, sampling, and instrumentation problems, the results have implications for theorists, educators, and researchers.

Discussion

As hypothesized, students' nutrition-related knowledge and attitudes were predicted on the basis of teaming to teach nutrition variables. On the other hand, students' nutrition-related practices were not predicted by teaming to teach nutrition.

Prediction of Students' Nutrition-Related Knowledge

The prediction of knowledge on the basis of teaming to teach variables is not consistent with the majority of previous studies of team teaching. Typically, knowledge scores have not been greater for team taught students or have been inconsistent (Blair, 1964; Gamsky, 1970; Heathers, 1964; Lambert, Goodwin, & Wiersma, 1965). In fact, one educator has stated that no innovative approach to education has been shown to be "significantly better than the conventional model with which it was compared" in increasing knowledge scores, an argument he used to explain why team teaching had been shown only to be "no less satisfactory than the conventional models" against which it had been compared (Widgerson, 1065, p. 324). In the current study, on

the other hand, teaming to teach variables were predictive of students' knowledge.

Prediction on the basis of degree of involvement--individuals. Other community resource persons' involvement in teaming to teach was a positive predictor of students' nutrition-related knowledge. This group of persons, defined to exclude nutrition experts, potentially is the most diverse in composition because it can include persons from any of the extended microsystems associated with the elementary school classroom microsystem. Other community resource persons had the lowest degree of involvement of any group, suggesting that even a minimal level of involvement of these individuals is sufficient to produce positive results. The effectiveness of this group's involvement in predicting students' outcomes is supportive of the current demand for increased participation of community members in the conduct of public education.

The degree of involvement of students in the teaming to teach process also was a predictor of students' nutrition-related knowledge. Perhaps students' involvement was effective because it acted as a signal to student learners that the information was "acceptable" to the peer group. It is possible also that student involvement was used by teachers as a means of discovering which materials and approaches would be most useful with the larger student group. Students had a relatively high level of involvement in the development of goals and activities, but it was in conducting and evaluating activities and that students' degree of involvement was exceptionally high. Overall, students' degree of involvement was higher than for any other group.

The contributions of system-level supervisors and school support staff to prediction of students' nutrition-related knowledge were negative. Although it is possible that the information provided by these individuals was inaccurate or perceived inaccurately by the students, a more likely explanation is based on examination of the mean degree of involvement for the two groups. Both types of individual have low degrees of involvement in relation to most other types. Perhaps the level of participation for these persons was so low that it required time on the part of the classroom teacher without returning an equal value for the students. On the other hand, the degree of involvement of other community resource persons, a positive predictor, was lower than that of either system-level supervisors or school support staff. Possibly the value of other community resource persons is so great because these individuals can bring unique contributions into the elementary school extended microsystem, whereas system-level supervisors and school support staff usually are available to teachers and may have little to contribute that the teacher could not bring into the team more easily.

The involvement of school media specialists, building-level administrators, other teachers, parents, nutrition experts, and school food service personnel was not predictive of students' nutrition-related knowledge. Although the mean degree of involvement for building-level administrators was quite low, the means for the other groups were in the moderate range. Certainly, one might expect that the involvement of media specialists would be predictive of nutrition-related knowledge because media specialists have access

to many print and nonprint references. However, the materials available to the media specialist may contain few nutrition-related resources, duplicate resources already available to the classroom teacher, or be outdated or inaccurate--and therefore be of little value. The involvement of other teachers in teaming has been tested previously and found to have little or no effect on students' knowledge outcome scores. However, from a system theory perspective, other teachers could be expected to be valuable members of a team, assuming that the information and characteristics they bring to the team do not duplicate the information and characteristics brought by the classroom teacher. Because the content of education obtained by most elementary school teachers is similar and because their roles almost are identical, it is quite possible that involvement of more than one teacher is redundant.

Parents are another group whose contribution may not be different enough from that usually available in the classroom or at home to have positive prediction value, at least at the level of participation obtained in the current study. It is possible that the effort required to bring parents' own nutrition knowledge to a level that would allow them to participate in the alteration of students' nutrition-related knowledge would take so much of the teacher's time that the overall effect on student outcomes would be negative. (On the other hand, the long-term effects might be positive; younger siblings of the targeted students might reap benefits from the current effort.)

Although one would expect the impact of nutrition experts on the conduct of nutrition education to be positive, their involvement

was not predictive of students' nutrition-related knowledge scores in the current study. This failure of prediction may be a function of the level of information used in elementary school nutrition education units. That is, the concepts covered in a relatively short nutrition education unit in an elementary school classroom are unlikely to be complex and are likely to be present in materials available to the classroom teacher. The nutrition expert might be more effective in settings in which very few materials were available, requiring the classroom teacher to depend on human rather than archival resources. It is likely that the involvement of the nutrition expert also would have a greater impact at the secondary level, where more sophisticated concepts can be covered.

The involvement of school food service personnel was not predictive of students' nutrition-related knowledge in the current study, although Tennessee NET program planners placed a heavy emphasis on the involvement of school food service personnel in the instructional team. Certainly such a team has appeal in that food service personnel provide the meals that most children consume at school. It is possible that, currently at least, food service personnel do not have the depth of nutrition information that would allow them to make a contribution different from that of the classroom teacher. Another possibility is that food service personnel were asked to be involved or allowed themselves to be used only in ineffective ways. Anecdotal records of activities used by teachers in the study indicate that food service personnel were used overwhelmingly in the provision of activities such as tasting parties, at which students were encouraged to

taste unfamiliar foods. Possibly school food service personnel can be used in other types of activities, particularly those that would allow students a view of the appropriate preparation and storage of foods.

Prediction on the basis of degree of involvement--instructional components. Only a small amount of variability in students' nutrition-related knowledge was explained by the degree of involvement--instructional components. Because the high degree of multicollinearity among the seven types of instructional components measured in degree of involvement--instructional components necessitated the collapse of the individual categories into an aggregate variable, it is possible that prediction on such a gross level is not practical. Maybe a method could be devised to measure degree of involvement in the various instructional components that would help to avoid the problem of multicollinearity.

Prediction on the basis of the composite assessment of teaming. The composite assessment of teaming, itself composed of summary-type variables (i.e., the number of individuals who team to teach nutrition, the number of instructional components in which teaming to teach occurs, and the extent of teaming), also failed to predict students' nutrition-related knowledge. Possibly more discrete measures are required to detect the value of teaming to teach variables.

Prediction of Students' Nutrition-Related Attitudes

The results of the current study generally are consistent with the results in most previous studies of team teaching. In the

majority of studies of team teaching in which students' attitudes were measured, team taught students' attitudes became more positive than they been at the initiation of the study and/or were more positive than than those of comparison groups of traditionally taught students. This attitude superiority has been demonstrated on dimensions such as attitudes toward school (Burchyett, 1973; Gamsky, 1970) and attitudes toward others (Gamsky, 1970). Students also have tended to demonstrate greater interest in subject matter (Gamsky, 1970), which probably is reflective of an attitude dimension.

The few studies of team teaching in nutrition education have not included measures of nutrition-related attitudes. However, other attempts to change nutrition-related attitudes generally have not been successful (Glotzer & Nestor, 1980). Nutrition education evaluators have suggested that attitudes may fail to be changed through traditional nutrition education programs because the acquisition or alteration of attitudes may be more complex than the acquisition or alteration of knowledge (Glotzer & Nestor, 1980).

Prediction on the basis of degree of involvement--individuals.

The degree of involvement for building-level administrators had a positive predictive value for students' nutrition-related attitudes. The involvement of building-level administrators in the nutrition education program probably indicates more involvement of the school extended microsystem; that is, if the person(s) filling the role of building-level administrator take(s) the time to become involved in nutrition education, the message is sent that nutrition education is important. In most school settings, such a message would be

translated as an encouragement to other members of the school extended microsystem to support the program. Even if these other extended microsystem members do not team to teach nutrition actively, they may indicate interest and support that will be translated into an increased awareness of the program on the part of students. It is also likely that students tend to invest building-level administrators with a larger degree of perceived authority than any other person in the school extended microsystem, making it likely that students would accept the veracity of the information provided or endorsed by administrators.

The degree of involvement of other community resource persons seems to be related logically to students' attitudes. The group comprising other community resource persons potentially is diverse. Careful choice of persons from this group can result in the involvement of persons in whom students place much faith. For example, athletes are considered by many elementary school-age students to be the ultimate authority on food-related matters. Involvement of athletes in the teaming to teach effort might allow them to influence the level of nutrition-related knowledge.

Student involvement in teaming to teach nutrition also was a predictor of students' nutrition-related attitudes. It is likely that, at the elementary school age, the student's peer group is one of the strongest influences on the formation and alteration of attitudes. Attitudes involve a <u>set</u> of beliefs that predispose the holder to respond in a predictable way (Rokeach, 1972). Changing an attitude requires changing the set of beliefs that comprise the attitude.

As children begin to establish an identity apart from their parents, they begin to change some of the belief structures that comprise their attitudes. The persons with whom they come into contact, apart from their parents, are the most likely to have impact on these changing beliefs. Other children probably comprise the largest group of other persons with whom students have contacts. It also must be noted that students had the largest mean degree of involvement in teaming to teach for any type of individual.

The degree of involvement for media specialists was predictive of attitudes but not of knowledge. As noted earlier, it is possible that the nutrition education materials available to the media specialist duplicate or are inferior to the materials available to the classroom teacher. On the other hand, the media specialist is likely to have a wide-ranging knowledge of children's literature. The media specialist may choose to use library time or be invited to use class time to introduce children vicariously through literature to many different nutrition-related situations. For example, simply by reading Blubber by Judy Blume (1974), a story about an obese child, and discussing the story with the children, the media specialist may help the students reassess their attitudes toward overweight people and excessive consumption of food.

The degree of involvement of system-level supervisors was a negative predictor of students' nutrition-related attitudes. Because the major responsibilities of system-level supervisors lie in areas other than nutrition education, it is likely that they would not have a great deal of expertise or experience to share with the classroom

teacher. Nor would the amount of time they could contribute be very large. It is unlikely that these individuals contributed in any active sense to the negative prediction but rather that the time spent by the teacher contacting and involving them could have been spent in a more productive activity.

The degree of involvement for nutrition experts, school food service personnel, other teachers, school support staff, and parents did not result in prediction of students' nutrition-related attitudes. It is possible that an increase in the length of the nutrition unit, which potentially could permit an increase in the degree of involvement of these persons, might result in a prediction of students' nutrition-related attitudes. However, it is possible that the degree of involvement of parents never would result in a prediction of attitudes because students in the elementary school are beginning to shift their emphasis away from parents to their peer groups. Perhaps the influence of parents in the formation of children's nutrition-related attitudes is much more subtle than can be measured by the CANKAP; that is, parents' influence may be mediated through other groups in terms of the amount of contact parents allow with the students' peer group or the amount of tacit approval they indicate for the establishment of independent habits.

The involvement of nutrition experts in the provision of elementary school nutrition education may be a duplication of resources. In most cases, teachers probably perceive nutrition experts as holders of nutrition-related factual information. Teachers are unlikely to approach nutrition experts for reasons other than attempting to obtain

such information. Because nutrition experts may have little information on the elementary students' level that is not already available to the teachers, the likelihood of this group's having a positive influence on the prediction of students' nutrition-related attitudes is small.

Other teachers and school support staff also may not have unique contributions to make apart from that available from the classroom teacher. Unless persons from these groups are particularly influential with children because of characteristics of the individuals themselves or of the school extended microsystem in which they function, their involvement probably would have to be much higher to produce prediction of students' nutrition-related attitudes and even then might fail to be predictive.

That involvement of school food service personnel also failed to predict students' nutrition-related attitudes is more difficult to explain. As noted earlier, anecdotal records of nutrition activities used by teachers in the study indicate that the most common involvement of school food service personnel was in the provision of tasting parties for students. Perhaps this role for food service personnel was too similar to the role in which the students see them every day. Too often, service personnel of all types become "background," stripped of personality by their role. The impact of school food service personnel on students' nutrition-related attitudes might be greater if the food service personnel could be persuaded to step out of their roles and interact on a more personal basis with the students. Then, when they resumed their food service roles, students

might be able to appreciate the food service better and develop more postive attitudes toward it. Another possibility is that the situations involved in tasting parties do not call into play students' attitudes in a realistic enough way to allow the students to question and/or eventually change the attitudes.

Prediction on the basis of degree of involvement--instructional components. The collapsed instructional component variable was predictive of students' nutrition-related attitudes. However, the variable in its collapsed state probably is of little value as a predictor because of the grossness of the measurements.

Prediction on the basis of the composite assessment of teaming. Students' nutrition-related attitudes were predicted by the number of individuals who team to teach nutrition and the number of instructional components in which teaming occurs, two categories of the composite assessment variable. Although a small degree of prediction was achieved with these categories, these summary-type variables do not provide much information not available in the other variables. However, these predictions do support the predictions found with the other variables.

Prediction of Students' Nutrition-Related Practices

The aim of education is to influence students' practices. However, the measurement of the practices often is difficult. In most academic subject areas, it is difficult to construct a measure of practices other than classroom testing of the skill involved. On the

other hand, nutrition-related practices can be observed indirectly by paper-and-pencil tests or directly by observational procedures such as the weighing of food not consumed at a meal. Such direct and indirect measures of nutrition-related practices have been found in increasing numbers in recent studies of nutrition education.

Regardless of the type of measure, nutrition-related practices have remained very resistent to change (Glotzer & Nestor, 1980). The most successful alteration of nutrition-related practices often has involved some form of positive reinforcement of the desired practices (Clark & Fisher, 1975). Some success in changing nutrition-related practices also has been achieved using direct student involvement in animal-feeding experiments. Although some teachers in the current study may have included reinforcement of desired practices or the use of animal feeding experiments in their nutrition education units, anecdotal reports of the activities suggest that such methods were used rarely if at all. In fact, most of what goes on in a classroom is directed at altering the level of knowledge in a given area. Anecdotal records suggest that most activities used in the present study were focused on changing knowledge rather than practices. It is likely that substantive changes in activities would be made if teachers were to shift their focus to alteration of practices.

Because nutrition-related practices occur in so many settings (e.g., home, school, the homes of friends and relatives, commercial eating establishments), these practices are acted upon by influences from many extended microsystems related to the elementary school classroom. Habits can be difficult and time-consuming to alter even

when an individual applies a great deal of determination to the effort. In fact, many theorists assert that practices will change only after knowledge and attitudes change (Glotzer & Nestor, 1980). It is possible, therefore, that the short time periods involved in the nutrition units presented in the current study were not sufficient to produce these changes or that the measures of nutrition-related practices used in the study were not sufficiently sensitive to detect the slow changes occurring in practices.

However, an alternative explanation exists. It is likely that teachers in the study have failed to make use of existing knowledge about establishing and encouraging generalization of behaviors. Although certain of the aspects of the technology of generalization are inherent in the teaming to teach approach--notably the involvement of sufficient exemplars (multiple instructors, in this case)--it is not likely that teachers have attended to the need for training in settings as similar as possible to the settings in which the desired practices are to occur (Stokes & Baer, 1977). Because many of students' nutrition-related practices occur outside school in settings very different from the settings in which nutrition education usually takes place, it is logical that generalization fails to occur. Anecdotal records of teaching activities also indicate that teachers generally have failed to take advantage of individuals proximal to students in terms of the respect students assign to them. That is, the teachers may not have made the effort to determine which members of system levels related to the classroom are powerful models and thus

may have failed to use such models to present instruction in appropriate nutrition-related practices.

Limitations of the Study

Even though every effort was made to avoid the shortcomings of previous team teaching studies in the research design and methodology of the current study, certain limitations are present. Design constraints prevented the investigation of causal relationships. Sampling restrictions, present in most studies of team teaching, limit the generalizability of the results. The use of a previously untested instrument (the TTNQ) may have affected the validity of the data, as with poor reliability of some scales on some forms of the CANKAP. Finally, because not all variables that could affect student nutrition-related outcomes could be included in the study, it is possible that the dependent variables were influenced by variables not measured in the current study.

Design

A correlational design such as the one used in the current study allows the prediction of the contributions of the independent variables. However, one cannot infer causality with such a design. A stronger design would be to include, in addition to random selection of students and their random assignment to participant classrooms, pre- and posttest assessment of the students' outcome measures in treatment and comparison classrooms. Although the financial investment in such a study would be much greater, one could make recommendations based on the findings more confidently.

The current study was exploratory in nature, however. The use of correlational designs in studies of an exploratory nature allows one to look at relationships among variables with a relatively small expenditure of time and money. If relationships are found, further quasi-experimental studies are warranted.

Sampling

The current study is an improvement over previous studies of team teaching in that it included a larger sample of students over a greater geographical area. However, as is often the case in social research, the selection and assignment of a probability sample were not feasible within the school system structure. Although it would have been preferable to select student participants randomly and assign them to participant classrooms, in reality such selection and assignment were impossible. To secure the cooperation of school system and building-level administrators, selection of schools and classrooms within schools was left to local authorities.

Ideally, large numbers of schools and school systems across the country would consent to selection of schools in which students would be assigned randomly to targeted classrooms to study the effects of teaming to teach. In reality, it is unlikely that such an agreement ever could be reached. However, the sample of students in classrooms used in the current study was large. The large sample probably resulted in an approximation of the normal curve for students' characteristics, minimizing problems associated with a nonrandom sample.

The method of obtaining teacher participants also may have presented a problem. The teacher participants were self-selected in that they could choose to participate by returning the TTNQ. A check of nonrespondents revealed that they either forgot or were too busy to complete the instrument; however, some relationship may exist between willingness to complete the instrument and any or all of the teaming to teach variables.

Instrumentation

Although the CANKAP has been used several times and revised to improve its performance as a means of data collection, the reliability of the attitudes and practices scales is poor for the younger students. This limited reliability may affect the validity of the data. The TTNQ previously was untested. Even though problems revealed during pilot testing were corrected, other problems did not become obvious until the data had been collected.

One problem with the TTNQ had to do with data identifying the individual teacher respondent. Although the instrument included easily observed spaces for the teacher's name and school, several teachers omitted this information, making their data unusable. An unobtrusive code identification system probably would be preferable. The individuals who did not identify themselves may have been different from other respondents in terms of their use of teaming to teach nutrition.

Several teachers in the sample also had difficulty with an item on which they were asked to record the total number of student contact hours during which they provided nutrition education. The numbers of hours

recorded by some teachers was unreasonably large (200-300 hours), suggesting that the teachers misunderstood the item. One respondent provided a clue to the problem with a comment indicating that she had arrived at the total number of hours by multiplying the actual instruction time by the number of students in her class. Although the intention originally had been to include the number of hours of instruction in the analysis, the data were unusable.

A problem arose with the failure of some teachers to understand the difference between team teaching and the more liberally defined teaming to teach. Several teachers returned uncompleted questionnaires with notes explaining that their schools were not set up on a team teaching model. Apparently, these teachers had read only as far as the questionnaire title. As a result, some teachers were excluded from the study who might otherwise have been included. Because it is unlikely that this was a systematic error, it it unlikely that the validity of the data was affected.

The method of measuring the degree of involvement--instructional components also presented problems in that the data obtained from that scale were intercorrelated highly. As a result, the data obtained on that scale were of little value in prediction. It may not be possible to obtain uncorrelated data related to degree of involvement in instructional components. However, it might be worth the effort to experiment with alternative items to find out.

Finally, several variables that may have an effect on students' nutrition-related outcomes were not included in the study. For example, the level of nutrition-related training each teacher had

received prior to the beginning of the study was not measured, nor was the level of support for the nutrition education program provided by the building-level administrator. No study can include every possible influential variable, but other combinations of variables with teaming to teach variables should be investigated. Possibly the inclusion of other variables in prediction models along with the teaming to teach variables would result in the explanation of greater amounts of variability in students' nutrition-related outcome measures.

Implications

The results of this study have implications both for nutrition educators and for persons contemplating a team approach to instruction in any area. These implications include considerations for theory, application, and future research.

Implications for Theory

The conceptual framework for the current study was based on system theory. Whereas some of the results of this study provide support for system theory, others do not.

The prediction of students' knowledge outcomes was not supported consistently in the team teaching literature, whereas prediction of students' attitude outcomes typically have been related to team teaching variables. Students' practice outcomes generally have not been studied in the team teaching literature. On the basis of a system model, it was hypothesized in the current study that students' nutrition-related knowledge, attitudes, and practices would be predicted by teaming to teach variables. These hypotheses were based on the

potential of the teaming to teach approach, which can include as members of the team persons from any related extended microsystem or exosystem, to facilitate the flow of a greater volume and diversity of information into the classroom microsystem. This increase in the volume and diversity of information was conceptualized as being likely to result in changes in the classroom microsystem that in turn would result in a new point of equilibrium for students' nutrition-related knowledge, attitudes, and practices.

Positive predictors. The hypothesized relationships were found to exist between students' nutrition-related knowledge and attitudes and certain categories of teaming to teach variables. Positive relationships were shown between the degree of involvement of students and community resource persons and students' nutrition-related knowledge and attitudes. The predictive value of students' involvement can be explained within the system theory framework in terms of the likehood that elements that are in close proximity to one another within the system will have an effect on one another; students are proximal to one another not only physically but also in age and usually in developmental level (e.g., in abilities, interests).

The involvement of students in teaming to teach nutrition may help remove some of the most difficult-to-overcome system barriers--those present in the students' peer group. The peer group becomes increasingly important to the school-age child in part because the child in school spends as much or more time with peers as with parents or other adults. As students take on responsibilities in teaming, they may be perceived by other students as accepting the validity of

the presented material, thus removing perceived barriers to the material. The positive influence of the degree of involvement of other community resource persons also is consistent with system theory. The group comprising other community resource persons potentially is the most diverse in terms of factors such as occupation, age, ethnic origin, and level of education. Entry of these individuals into a classroom microsystem should require a permeable boundary; exclusion of these individuals would indicate a semipermeable boundary at best.

Permeable boundaries are characteristic of open systems that in turn are subject to change as new information upsets the status quo and causes the system to seek a new point of equilibrium. The involvement in teaming to teach of persons from the various system levels also may help to neutralize system boundary filters to information because these persons represent the filtering agents against information from the students' points of view. For example, a student who has the impression that fasting is an acceptable procedure may be more likely to accept the knowledge that fasting is not healthful if the information comes from a fashion model or an athlete (e.g., a person perceived by the student to be both informed and socially wise) than if it comes from a teacher who appears matronly to the student.

Students' nutrition-related attitudes also were predicted by the degree of involvement of building-level administrators and school media specialists or librarians. Building-level administrators may be conceptualized as being proximal to every individual in the classroom microsystem in that the person filling that role potentially can manipulate all occurences within the school extended microsystem,

within which the classroom microsystem exists. The building-level administrator has influence because of the position, totally apart from or in addition to the personal influence of the person who fills the position. School media specialists are not proximal to students in the sense that other students or the building-level administrator are. However, the media specialist or librarian potentially can bring the world (vicariously) into the classroom. The media specialist or librarian can introduce students to the ways other people like themselves and unlike themselves use, think about, and feel about food and nutrition. The admission of this potential parade of characters from literature also requires permeable classroom specific microsystem boundaries.

Negative predictors. System theory is not supported as directly by the negative predictions discovered in the current study. The degree of involvement of system-level supervisors negatively predicted both students' nutrition-related knowledge and attitudes, and the degree of involvement of other school support staff negatively predicted students' nutrition-related knowledge. Although both types of individuals had low levels of participation, the participation of community resource persons, a positive predictor, was as low or lower. It is possible that these individuals provided inaccurate information or were perceived inaccurately in their involvement. However, it is more likely that their contributions were not sufficiently different from those of the classroom teacher to make up for the time spent by the teacher in setting up and administrating their involvement. Other community resource persons, on the other hand, probably were

chosen on the basis of some characteristic that made them stand out from other persons in the community as uniquely valuable to the presentation of nutrition education.

Failure to predict. Students' nutrition-related knowledge and attitudes were not predicted by the involvement of nutrition experts, food service personnel, other teachers, or parents. In addition, students' nutrition-related knowledge was not predicted by the involvement of building-level administrators or school media specialists or librarians and students' nutrition-related attitudes were not predicted by the involvement of other school support staff.

Although parents are proximal to students within the family extended microsystem, they typically do not have such a relationship with students within the classroom microsystem. Even though parents' involvment in the classroom microsystem potentially could increase substantially as a result of the teaming to teach approach, only four other types of individuals (building-level administrators, system-level supervisors, school support staff, and other community resource persons) had lower levels of participation. Perhaps the classroom teacher role supercedes the parent role in matters that occur in the classroom microsystem to the extent that in loco parentis is the rule.

Other teachers may or may not be proximal to students, depending on the structural organization of the school. If instruction is departmentalized (i.e., divided among teachers with each teacher instructing two or more groups of children in one or more subject areas), teachers other than the student's primary or "home room"

teacher may be proximal to the student within the school extended microsystem and thus be expected to have a greater influence on the student. However, even in such a case, the influence of other teachers may not be very different in content from that of the home room teacher or the teacher who leads the teaming to teach team. Most elementary school teachers receive very similar educations and have very similar roles within the school extended microsystem. Also, the involvement of other teachers is not as great an indicator of permeable classroom mircosystem boundaries as is the involvement of other types of individuals, such as other community resource persons.

School food service personnel and nutrition experts represent two possible sources of information about food and nutrition. In the current study, the mean degree of involvement was 1.53 ± .93 for nutrition experts and 1.64 ± .86 for school food service personnel, which represents a fairly low level of involvement for both. Anecdotal records from participating teachers indicate that school food service personnel most commonly were asked to be involved as team members in preparation for and presentation of various food exploration activities, such as food tasting parties. Tasting parties are intended to be fun for students and to present new foods in a nondirective and nonthreatening situation. Direct teaching usually is avoided. Outside of allowing the use of a cherished personal recipe, it is unlikely that the school food service personnel brought anything to the activity that the teacher who was team leader could not have provided.

The group comprising nutrition experts potentially could include nutritionists, dietitians, and/or other professionals who have obtained training in nutrition; however, anecdotal records indicate that this group most commonly included only nutritionists employed by the local school board. These individuals certainly are not proximal to the student in the classroom microsystem or the school extended microsystem. Although an invitation by the classroom teacher to the nutrition expert to participate as a team member indicates permeable classroom boundaries, one also must consider the nature of the information the nutrition expert is asked to provide as a team member. It is likely that the nutrition experts were viewed by classroom teachers mainly as sources of factual information. Much of the information on a level appropriate for use with elementary school students and available from the nutrition experts also could be obtained easily from printed materials. Possibly, the involvement of nutrition experts would predict students' nutrition-related variables if the individuals asked to participate were more varied; for example, the information solicited by the classroom teacher from a dietitian whose responsibility is meal-planning for a hemodialysis unit would be quite different from the information solicited from the nutrition expert on contract to the local school board.

The failure of the involvement of building-level administrators and school media specialists or librarians to predict students' nutrition-related knowledge also may be a result of too great a similarity between the information they could contribute to the team and

the information contributed by the classroom teacher. The building-level administrator is unlikely to have particular expertise in nutrition-related areas. Although involvement of the building-level administrator may lend credence to information presented by other team members, a greater degree of involvement may be required to produce changes in nutrition-related knowledge. Similarly, although the school media specialist or librarian has access to and knowledge of nutrition-related materials available in the school media center, these materials may be outdated, inadequate, or actually inaccurate.

Students' nutrition-related attitudes also were not predicted by the involvement of other school support staff. These individuals perform essential tasks in the elementary school extended microsystem that, nonetheless, typically are not part of the instructional process. Therefore, although special friendships may grow up between some of these individuals and certain students, other school support staff generally are not proximal to students in most senses. It is unlikely also that other school support staff would have information sufficiently different from other team members to make other school support staff's involvement a predictor.

Extreme multicollinearity among categories of degree of involvement--instructional components required collapse of the categories into a single variable. The resulting variable was not predictive of students' nutrition-related knowledge or practices and was responsible only for a very low level of prediction of students' nutrition-related attitudes. Although it is impossible to be sure,

it is possible that failure to predict on the basis of this variable is a function of the grossness of the measure.

Although students' nutrition-related knowledge and attitudes were predicted on the basis of several teaming to teach variables, no prediction of students' nutrition-related practices was found in the current study. It is possible that the time period encompassed by the study was not sufficient to alter practices. In fact, theorists often have advanced the explanation that practices can change only after attitudes, which in turn can change only after knowledge changes. On the other hand, because self-report measures of practices were used in the current study (e.g., "Do you usually wash your hands before you eat?" "Do you eat taste new foods before you decide whether or not you like them?"), the data are more subject to bias than data obtained by observation might be. Therefore, it is possible that the failure to predict students' nutrition-related practices may be the result of measurement error.

Barring time factors and measurement error, the inability to predict students' nutrition-related practices on the basis of teaming to teach variables is somewhat more difficult to explain within a system theory framework. However, possible explanations do exist. One must remember that almost all of a students' nutrition-related practices occurred in system levels other than the classroom microsystem in which most instruction and the measurement of practices took place. Perhaps the instruction that occurred in the classroom was too remote from the system levels in which the practices occurred to effect changes in those practices.

It also is possible that separate system are operating for behaviors such as knowledge and attitudes and behavior clusters such as nutrition-related practices, resulting in subsystems existing side by side but with incomplete influence on one another. If this is the case, teachers will have to learn to program specifically for the modification of behavior. The nutrition education literature supports the idea that changing practices may require specific programming to target practices; of the few studies in which successful attempts to change practices have been reported, most have included some form of behavior modification involving positive reinforcement of desired practices (Birch et al., 1981; Boysen & Ahrens, 1972; Ireton & Guthrie, 1972).

Implications for Practice

Teachers who wish to change levels of knowledge or attitudes will find support for a teaming to teach approach to instruction in the current study. The alteration of attitudes particularly is supported because the results of the current study are consistent with previous studies of team teaching. Teachers who wish to alter nutrition-related attitudes previously had little encouragement from the nutrition education literature. However, results of the current study support the possibility that attitudes may be altered by the use of the teaming to teach approach.

Because no predictive value was found for nutrition-related practices, teachers who wish to produce changes in practices should consider other approaches (e.g., positive reinforcement of desired

practices) that have been shown to produce such changes. Teachers generally have not planned units in most academic subjects to teach directly for influence on practices. Attention paid to planning for such changes is likely to result in several changes. A technology exists within applied behavior analysis that may facilitate establishment and generalization across time, persons, and settings (Stokes & Baer, 1977). That technology includes such techniques as "training loosely" (providing examples that are not identical to one another), programming common stimuli (making sure that the teaching environment is similar in as many ways as possible to the situation in which the student is expected to exhibit the practices), and training sufficient exemplars (including such things as using multiple instructors, teaching in different settings, and teaching at different times of day). Teaching to alter practices also may require the classroom teacher to identify clearly the practices to be changed, develop easily measurable behavioral objectives, and use measures that extend beyond the usual paper-and-pencil tests commonly used for evaluation. Formative as well as summative evaluation with timely feedback to the student may be indicated; teachers might learn from athletic coaches who teach practices (sporting skills) with a combination of description and demonstration of the desired practices and immediate feedback on good and bad examples of the desired practices. It also may be important for the teacher to task analyze the practices to be certain or the behavioral components involved and to plan lessons that introduce these components in easily accepted steps.

Teachers also need to consider which individuals to include in the teaming to teach team. On the basis of the current study, recommendations can be made for nutrition education teams. Until further evaluations of teaming to teach can be conducted in other academic areas, teachers must be cautious about applying these recommendations to subjects other than nutrition education. The involvement of students and other community resource persons in the teaming to teach nutrition procedure appears to be appropriate because the involvement of both types of individuals was predictive of students' nutrition-related knowledge and attitudes. The involvement of building-level administrators and media specialists or librarians in the teaming to teach nutrition procedure was predictive of attitudes; therefore, it also would be reasonable to include these persons in teaming to teach. The involvement of system-level supervisors in teaming to teach nutrition resulted in negative prediction of both nutrition-related knowledge and attitudes of students. Until further investigation can be conducted, the involvement of these persons and persons from the remaining groups whose involvement was not predictive of students' outcomes must be left to the individual teacher, who must decide whether the effort required to involve these groups will be greater than the possible return.

One way in which the teacher can use the results of the current study in instruction is to assess carefully the extended microsystems associated with the elementary classroom with an eye toward identifying types of individuals who potentially could perform a filtering function against information. As noted earlier, some teams become insular and

actually create a role for an individual whose resposibility is to screen contradictory information (Fincher, 1976). When these possible filtering individuals have been identified, it may be possible to recruit representatives of these groups as members of the teaming to teach team and thus potentially to neutralize the filtering effect. For example, alteration of lunch consumption practices of students who bring their lunches from home requires the cooperation of the persons who buy the food and make the lunches--usually parents. Involvement of parents in terms of providing them with information about the value of lunchtime meals and appropriate inclusions in a child's lunch may avoid the potential filtering effects parents may perform in relation to home-packed lunches.

Students' opposition to changes in lunch content similarly might be overcome by involving persons who are in proximity to students in terms of the high regard in which they are held by students (e.g., athletes, models, newscasters). These persons could discuss the advantages of good lunchtime nutrition with the students. If potential filters are identified and planned for, it is possible that the majority of these filters could be overcome.

Parents also could be involved in other instructional components of the nutrition unit. As the parents become involved, they might become interested in presenting this information to other parents. One under-used avenue for involvement of many different types of individuals is the Youth Advisory Council (YAC). This and similar groups can be organized as ongoing methods of casual instruction as well as a means of allowing student input into the school food service program.

Implications for Further Research

Because no previous studies have been located in which this liberal, teaming to teach interpretation of the team teaching model was tested, the results of the present study are indicative of the need for further investigation. Although the magnitude of the relationships obtained was modest, the results of this study are consistent with the contention that teaming among teachers and any number of members of extended microsystems associated with the elementary school classroom may result in positive changes in students' knowledge and attitudes. Teaming to teach is a procedure that can be used by any teacher in any physical plant, making it possible for teaming to occur in settings that otherwise might be overlooked. Further investigation should be conducted to determine whether these relationships between teaming to teach and the criterion variables of nutrition-related knowledge and attitudes are borne out. Future studies could be planned to include a greater length of exposure to teaming to teach instruction to determine whether other levels of the predictor variables become predictors if time and/or level of involvement is increased. For this reason, at least some future studies should be planned to continue over long time periods.

Further investigation of teaming to teach nutrition education also is indicated. The relationships between teaming to teach and nutrition-related attitudes are very encouraging to nutrition educators because of difficulties encountered in the past in altering nutrition-related attitudes. One direction for research would involve a treatment group in which teachers would receive direct instruction

in use of the teaming to teach procedure, including ways in which to maximize the involvement of persons in different system roles, whereas a comparison group of teachers would receive training only in traditional presentations of nutrition education. A quasi-experimental design could be used to strengthen the observation of the value of teaming to teach in altering nutrition-related knowledge, attitudes, and practices. Because nutrition-related practices are the real targets of most nutrition education, it is particularly important that researchers investigate teaching planned specifically to alter practices. The components of the implicit technology of generalization described by Stokes and Baer (1977) should form the basis for plans for changing practices. For example, it would be desirable to investigate training loosely, training sufficient exemplars, and programming common stimuli in the nutrition education unit. In addition, the use of specific behavioral objectives, description and demonstration of desired practices, immediate feedback, and/or positive reinforcement of desired practices all could be investigated. Certainly, teaching based on one or more of the above concepts currently holds out the best hope for changing practices.

A final cautionary word about the predictions found in the current study must be made. The level of prediction as indicated by the $\underline{R}^2$ coefficient was relatively low, suggesting that several other factors are operating in the determination of students' nutrition-related knowledge, attitudes, and practices. Students' nutrition-related knowledge, attitudes, and practices have been found to be influenced by such varied factors as the students' religion, ethnic and cultural

heritage, age, gender, and socioeconomic status (AuCoin, Haley, Rae, & Cole, 1970); early experiences with food and geographical location of residence (Lowenberg, 1974; Sanjur & Scoma, 1971); the atmosphere during meals, peer pressure, and teachers' attitudes toward nutrition education (O'Connell, Shannon, & Sims, 1981; Shannon, Marbach, Graves, & Sims, 1981; Skinner & Woodburn, 1983); and teachers' level of nutrition education and willingness to eat with their students (Perkins, Roach, & Vaden, 1980). Although the scope of the current study did not allow inclusion of these variables, it would be desirable to include as many as practical in future studies.

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APPENDICES

APPENDIX A

INSTRUMENTS

Form 9--Page 1 (E)
K-1

NUTRITION EDUCATION ASSESSMENT

SECTION I

Directions: For each item in this section (Questions 1-8), mark an "X" through the face on the answer sheet that shows how you really feel about that idea. The faces are as follows:

1 = Sad (I do not like it.)

2 = Happy (I like it.)

(1) How do you feel about the food that is prepared for lunch at your school?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

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

1 = Sad (I do not like it.)
2 = Happy (I like it.)

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

1 = Sad (I do not like it.)
2 = Happy (I like it.)

(4) How do you feel about having Coke rather than milk with a meal?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

(5) How do you feel about eating in a noisy place?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

(6) How do you feel about preparing snacks for yourself and your friends?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

(7) How do you feel about eating vegetables?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

(8) How do you feel about reading books about food?

1 = Sad (I do not like it.)
2 = Happy (I like it.)

SECTION II

Directions: For each item in this section (Questions 9-17), mark an "X" through the symbol on the answer sheet that shows what you really do. The symbols are as follows:

1 = Square = NO (I usually do not do this.)
2 = Star = YES (I sometimes do this.)

(9) Do you eat the lunch prepared at your school?

1 = No (Square)
2 = Yes (Star)

(10) Do you help someone at your school decide what will be served for lunch?

1 = No (Square)
2 = Yes (Star)

(11) Do you learn from your teacher about foods that are good for you?

1 = No (Square)
2 = Yes (Star)

(12) Do you learn from someone at home about foods that are good for you?

1 = No (Square)
2 = Yes (Star)

(13) Do you help prepare meals at home?

1 = No (Square)
2 = Yes (Star)

(14) Do you eat many different kinds of foods?

1 = No (Square)
2 = Yes (Star)

(15) Are there any foods you do not eat because of the way they look?

1 = No (Square)
2 = Yes (Star)

(16) Do you taste new foods before you decide whether or not you like them?

1 = No (Square)
2 = Yes (Star)

(17) Do you wash your hands before you eat?

1 = No (Square)
2 = Yes (Star)

SECTION III

Directions: For each item in this section (Questions 18-37), make an "X" through the symbol on the answer sheet that matches the symbol on the picture of the best (most correct) answer to the question.

(18) Which of these snacks would be best to keep you healthy?

(circle) 1 = Chewing gum
(square) 2 = Doughnut
(triangle) 3 = Kool-Aid
(star) 4 = Orange

(19) How would a child probably feel who does not eat breakfast?

(circle) 1 = Happy
(square) 2 = Lively
(triangle) 3 = Scared
(star) 4 = Tired

(20) Which of these foods usually feels hot when you eat it?

(circle) 1 = Cottage cheese
(square) 2 = Jello salad
(triangle) 3 = Milk shake
(star) 4 = Vegetable soup

(21) Where do we get the foods we eat?

(circle) 1 = From animals and plants
(square) 2 = From animals and water
(triangle) 3 = From plants and rocks
(star) 4 = From rocks and water

(22) If you have a question about food, what would be the best way to answer it?

(circle) 1 = Ask someone else to help find the answer.
(square) 2 = Decide there is not an answer.
(triangle) 3 = Hope you will dream what the answer is.
(star) 4 = Make up an answer.

(23) For which of these things does a child need the most food?

(circle) 1 = Running
(square) 2 = Sitting
(triangle) 3 = Sleeping
(star) 4 = Watching TV

(24) Why do many people eat the same food every year on Thanksgiving Day?

(circle) 1 = It gives them plenty of energy.
(square) 2 = It is a family custom or habit.
(triangle) 3 = It is all that is in the grocery store.
(star) 4 = It is important to help them grow.

(25) What is the best place to keep cooked vegetables and meats?

(circle) 1 = In the cupboard
(square) 2 = In the oven
(triangle) 3 = In the refrigerator
(star) 4 = On the table

(26) Which of these people probably would know the most about what foods would keep you healthy?

(circle) 1 = A fire fighter
(square) 2 = A police officer
(triangle) 3 = A secretary
(star) 4 = A teacher

(27) What is the best way to get all the nutrients you need every day?

(circle) 1 = Drink plenty of milk.
(square) 2 = Eat different kinds of foods.
(triangle) 3 = Eat plenty of meat.
(star) 4 = Take vitamin pills.

(28) Which of these foods tastes sour?

(circle) 1 = Broccoli
(square) 2 = Carrot
(triangle) 3 = Lemon
(star) 4 = Pear

(29) Which of these foods do we get from an animal?

(circle) 1 = Cereal
(square) 2 = Egg
(triangle) 3 = Orange
(star) 4 = Peanut butter

(30) When is the best time to eat a snack?

(circle) 1 = Just before you eat lunch at school
(square) 2 = When you get home from school
(triangle) 3 = Just before you eat dinner
(star) 4 = After you go to bed

(31) Where are foods grown?

(circle) 1 = Factories
(square) 2 = Farms
(triangle) 3 = Grocery stores
(star) 4 = Restaurants

(32) What is the first thing you need to do before you eat dinner?

(circle) 1 = Pick up the fork.
(square) 2 = Say the blessing.
(triangle) 3 = Sit down at the table.
(star) 4 = Wash your hands.

(33) If you already know how to make a peanut butter sandwich, which of these snacks would be the easiest to learn to make?

(circle) 1 = Cheese sandwich
(square) 2 = Milk shake
(triangle) 3 = Peanut butter cookies
(star) 4 = Pizza

(34) Where do we get nutrients?

(circle) 1 = Air
(square) 2 = Exercise
(triangle) 3 = Food
(star) 4 = TV

(35) Why would most people rather eat at a pretty table than a messy one?

(circle) 1 = The food will smell better.
(square) 2 = The food will cost less.
(triangle) 3 = They will enjoy the food more.
(star) 4 = They will grow more.

(36) Which of these snacks could be prepared without cooking?

(circle) 1 = Crackers and cheese
(square) 2 = Grilled cheese sandwich
(triangle) 3 = Pizza
(star) 4 = Tomato soup

(37) If you want to know what is the best kind of cereal, why would it be a good idea to ask several different people?

(circle) 1 = Different people have different ideas about food.
(square) 2 = Girls like cereal better than boys do.
(triangle) 3 = Most people do not eat cereal.
(star) 4 = Some people do not like to talk about food.

SECTION IV

Directions: *Mark an "X" through the symbol that tells about you.*

(38) Are you a boy or a girl?

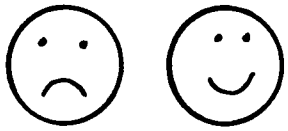
1 = Boy (Circle)
2 = Girl (Triangle)

(39) What grade are you in?

0 = K (Kindergarten)
1 = 1 (First grade)

Form 9--Page 1 (S)

SECTION I

(1) 
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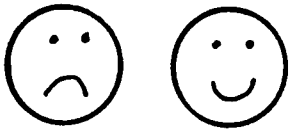
(2) 
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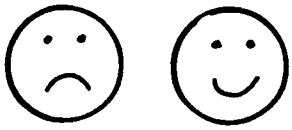
(3) 
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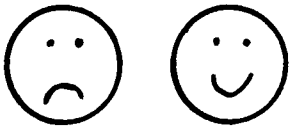
(4) 
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1 = Sad 2 = Happy

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1 = Sad 2 = Happy

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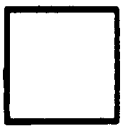
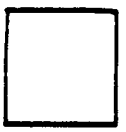
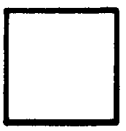
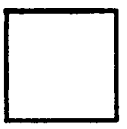
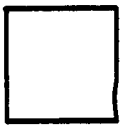
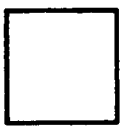
(9)  1 = NO 2 = YES

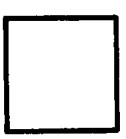
(10)  1 = NO 2 = YES

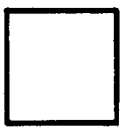
(11)  1 = NO 2 = YES

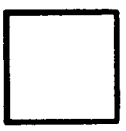
(12)  1 = NO 2 = YES

(13)  1 = NO 2 = YES

(14)  1 = NO 2 = YES

(15)  1 = NO 2 = YES

(16)  1 = NO 2 = YES

(17)  1 = NO 2 = YES

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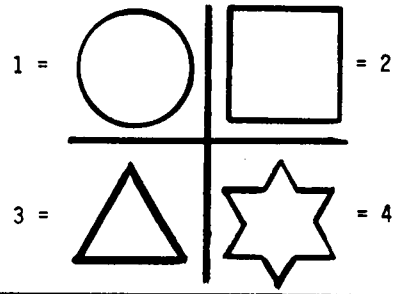

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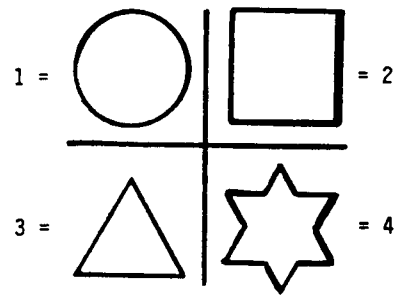

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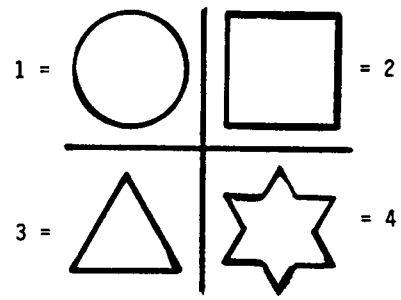

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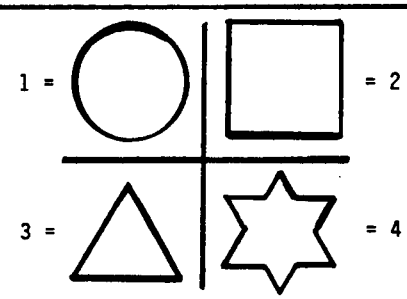

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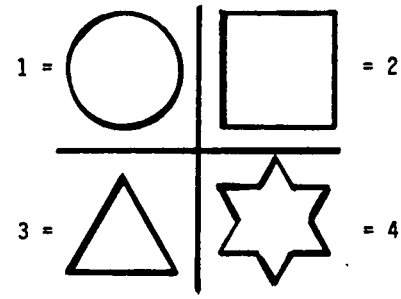

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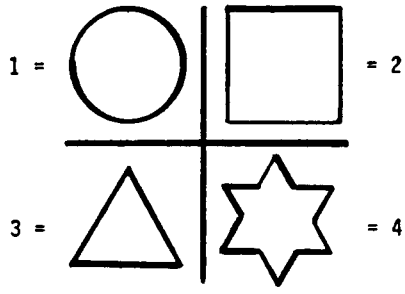

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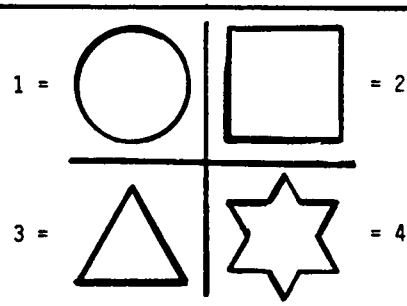

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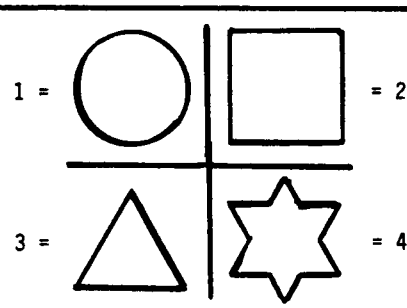

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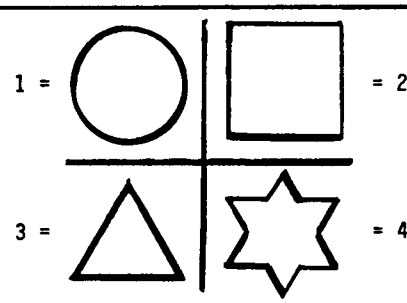

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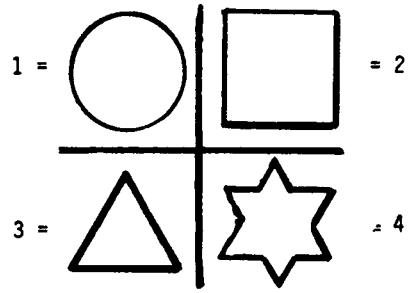

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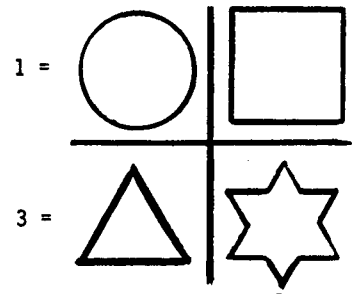

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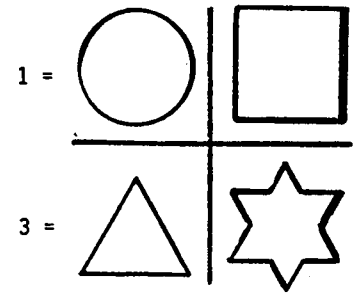

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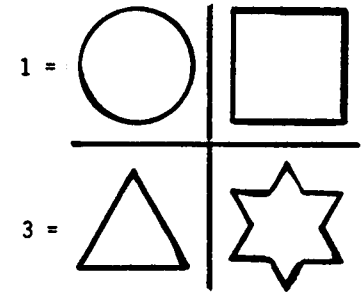

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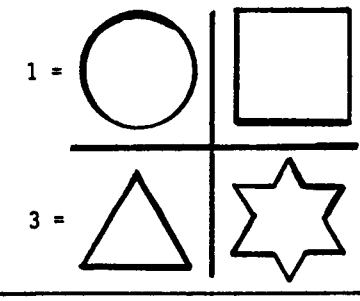

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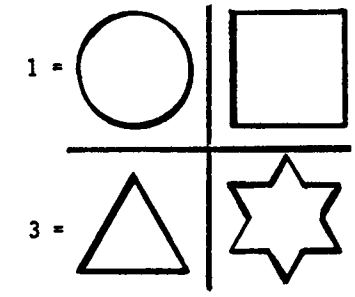

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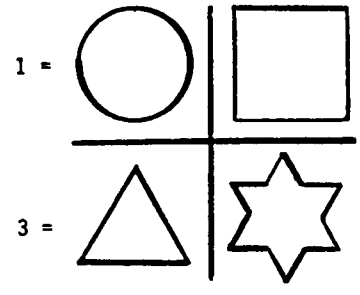

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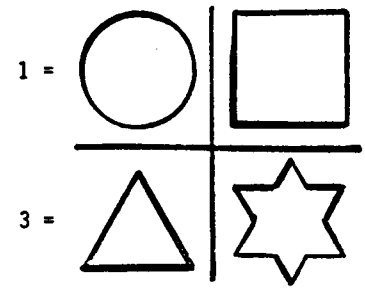

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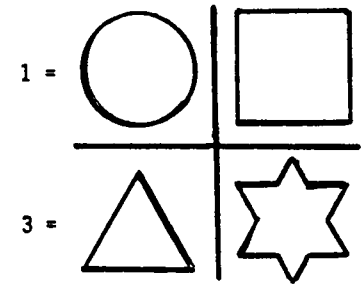

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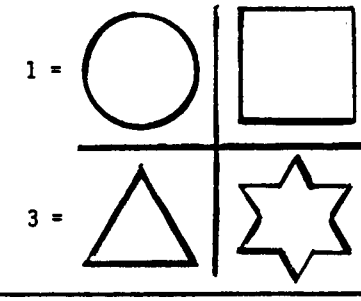

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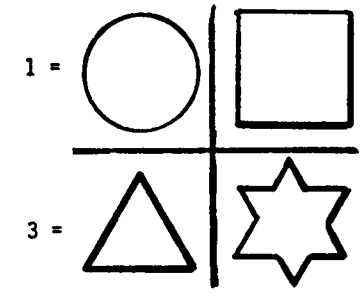
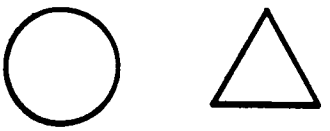


(38) 

1 = BOY 2 = GIRL

(39) K 1

0 = Kindergarten 1 = Grade 1

THANK YOU FOR YOUR HELP!

(cc 40-42) _____ Code

(cc 43-46) _____ ID

Form 8--Page 1
2-3

NUTRITION EDUCATION ASSESSMENT

SECTION I

Directions: For each item in this section (Questions 1-8), mark an "X" through the face at the left of the question that 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 prepared 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 loud talking while you are eating?

1 =  2 =  3 =  (6) How do you feel about preparing your own breakfast?

1 =  2 =  3 =  (7) How do you feel about using a recipe to prepare a food?

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 that 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 prepared 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 ask your parents about whether you should eat the foods you hear about on TV?
1 = NO	2 = YES	(14) Do you eat foods from each food group every day?
1 = NO	2 = YES	(15) Do you ever prepare a meal for yourself?
1 = NO	2 = YES	(16) Do you chew with your mouth open?
1 = NO	2 = YES	(17) Do you eat only foods that you have tried before?

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 question.

(18) What part of the carrot plant do people usually eat?

1 = Flowers
2 = Leaves
3 = Roots
4 = Seeds

(19) Which of these is the best reason for eating different kinds of food?

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.

(20) 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

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

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

(22) 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.

(23) 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 fast
4 = When you are learning to read

(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) In preparing 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 the milk on the corn flakes.

(26) 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

(27) Which of the following is a category of nutrients?

1 = Air

2 = Calories

3 = Milk

4 = Vitamins

(28) Which of these fresh foods would be more plentiful in the summer than the winter?

1 = Bread

2 = Carrots

3 = Milk

4 = Peaches

(29) Which of these drinks is the most nutritious source of energy?

1 = Chocolate milk

2 = Iced tea

3 = Orange pop

4 = Water

(30) 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.

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

1 = Apples in pie taste saltier.

2 = Apples in pie taste sweeter.

3 = Apples in pie taste more sour.

4 = Apples in pie taste the same as fresh apples.

(32) From what animals do we get beef?

1 = Cattle

2 = Chickens

3 = Pigs

4 = Sheep

(33) 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.

(34) In which food group does a pancake belong?

1 = Bread and cereal

2 = Meat, fish, poultry, and beans

3 = Milk and cheese

4 = Vegetables and fruits

(35) 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.

(36) Which of these foods should be cooked before it is <u>safe</u> to eat?

1 = Cabbage

2 = Egg

3 = Green beans

4 = Spinach

(37) 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.

Form 8--Page 6

SECTION IV

Directions: For each item in this section (Questions 38-44), draw a circle around the word at the left of the question that tells what you really think about whether the change described should be made in the food service program at your school. Use the following scale:

1 =  *No*

2 =  *Yes*

1 = NO   2 = YES   (38) Do more different kinds of foods need to be served?

1 = NO   2 = YES   (39) Do children need to be given more choices (e.g., salad bar, different kinds of drinks, different kinds of desserts)?

1 = NO   2 = YES   (40) Does better tasting food need to be served?

1 = NO   2 = YES   (41) Do there need to be bigger servings on the plates?

1 = NO   2 = YES   (42) Do children need to help more with planning meals and ways of doing things?

1 = NO   2 = YES   (43) Does service need to be faster?

1 = NO   2 = YES   (44) Do food prices need to be lower?

SECTION V

Directions: For each item in this section (Questions 45-46), draw a circle around the number of the correct answer.

(45) What is your sex?

1 = Boy

2 = Girl

(46) What grade are you in?

2 = Second

3 = Third

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE!

- -

(Do not write below this line.)

(cc 71-73) ______________ Code

(cc 74-77) ______________ ID

Form 7--Page 1
4-6

NUTRITION EDUCATION ASSESSMENT

SECTION I

Directions: For each item in this section (Questions 1-13), mark the circle on your answer sheet that indicates how you really feel about that idea. Use the following scale:

1 =  *I do not like it at all.*

2 =  *I do not like it much.*

3 =  *I like it a little bit.*

4 =  *I like it very much.*

(1) How do you feel about the food that is prepared for lunch at your school?

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

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

(4) How do you feel about eating vegetables and fruits?

(5) How do you feel about eating foods served in different ways?

(6) How do you feel about tasting foods from other countries?

(7) How do you feel about taking the advice of people who advertise foods on TV?

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

(9) How do you feel when you think about some people's not having enough to eat?

(10) How do you feel about eating foods that are high in sugar?

(11) How do you feel about working with other people to find the answers to questions about food?

(12) How do you feel about the different ways that people in other countries eat to keep healthy?

(13) How do you feel about eating only foods produced near where you live?

SECTION II

Directions: For each item in this section (Questions 14-27), mark the circle on your answer sheet that indicates how often you do what is described, using the following scale:

1 = Never
2 = Sometimes
3 = Often

(14) How often do you eat the lunch prepared at your school?

(15) How often do you help someone at your school decide what will be served for lunch at your school?

(16) How often do you learn from your teacher about foods that are good for you?

(17) How often do you learn from someone at home about foods that are good for you?

(18) How often do you drink milk or eat foods made from milk?

(19) How often do you eat foods that are prepared in new ways?

(20) How often do you refuse to eat foods from other cultures?

(21) How often do you work with someone to find the answer to a question about food?

(22) How often do you eat foods without thinking about your nutrient and energy needs?

(23) How often do you try to find out why certain foods are traditional in your family?

(24) How often do you eat fried foods?

(25) How often do you ask someone about the nutrients in the foods you eat?

(26) How often do you eat green vegetables?

(27) How often do you clean up your place at the table after you eat at school?

SECTION III

Directions: For each item in this section (Questions 28-47), mark the circle on your answer sheet that corresponds to the best (most correct) of the four response choices.

(28) How many servings from the meat, poultry, fish, and beans group are needed each day?

1 = Two
2 = Three
3 = Four
4 = Five

(29) What is the main reason that people in Iowa do not eat as much seafood as the people in Florida?

1 = Fresh ocean fish are expensive because they have to be shipped long distances.
2 = Many people in Iowa catch their own fish in local lakes.
3 = Most people in Iowa do not like seafood.
4 = Polluted water in Iowa has caused a shortage of fish.

(30) What is the main reason that companies sometimes put food in attractive packages?

1 = Attractive packages sell more of their products.
2 = Food companies like to help stores look nice.
3 = People like to use the containers after they empty them.
4 = The government requires food companies to package things in a certain way.

(31) Why do some diseases occur only in some parts of the world?

1 = People in some areas do not have food that contains all the nutrients they need.
2 = People in some parts of the world do not get enough sleep.
3 = People in some parts of the world do not take enough vitamin pills.
4 = People who live in cold climates get more diseases.

(32) What is the major reason many families in the U.S. eat more TV dinners than they used to?

1 = Cookbooks are too expensive for most families.
2 = Home-cooked meals usually are less nutritious than TV dinners.
3 = TV dinners always taste better than home-cooked meals.
4 = TV dinners take less time to prepare than home-prepared foods.

(33) How did the American Indians in the Southwest preserve most of their food?

1 = Canning
2 = Drying
3 = Freezing
4 = Pickling

(34) What is a major reason that children choose to eat candy, potato chips, and Cokes even though they know these foods are not the most nutritious snacks?

1 = Their parents tell them to eat these foods.
2 = These foods always are cheaper than more nutritious snacks.
3 = These foods are easier to digest.
4 = They like to eat the same foods their friends do.

(35) What do carbohydrates, fats, and proteins all do?

1 = Help regulate body temperature
2 = Prevent cavities
3 = Provide for the growth of muscles
4 = Provide energy for the body

(36) What kind of food would a family with Italian background probably eat?

1 = Almost all fried foods
2 = Many dishes made with macaroni and spaghetti
3 = Mostly high-protein foods
4 = Very mild-tasting food combinations

(37) Which of these foods contains the most protein?

1 = Baked sweet potato
2 = Fresh tomato
3 = Roast turkey
4 = Steamed rice

(38) If you are planning what to serve at a party, which of these things do you need to do first?

1 = Get ready the foods that can be prepared early.
2 = Get recipes for your favorite foods.
3 = Get several ideas about what to serve.
4 = Go to the grocery store.

(39) Why do people in Southeast Asia eat rice instead of wheat to keep healthy?

1 = Rice is a better source of carbohydrate.
2 = Rice is better for Asian people.
3 = Rice goes better with Chinese foods.
4 = Rice grows better in their climate.

(40) How would people probably react if green food coloring were added to their mashed potatoes?

1 = Everyone would like them just as well because the taste would be the same.
2 = Many people would like them better because they would be prettier.
3 = Many people would not like them because the color is not what they are used to.
4 = Most people would like them if butter were added.

(41) Why are refrigerated trucks used to get lettuce from the farmer to the consumer?

1 = They are the fastest way.
2 = They cost less to operate than other means.
3 = They preserve the caloric content of the lettuce.
4 = They preserve the texture of the lettuce.

(42) What is the main reason many people eat a large number of meals in restaurants?

1 = Eating out always costs less than eating at home.
2 = Restaurant food usually is more nutritious.
3 = They do not like to spend their time cooking.
4 = They like to meet new people.

(43) Where does digestion of food begin?

1 = Esophagus
2 = Intestines
3 = Mouth
4 = Stomach

(44) Why do Chinese children use chopsticks instead of knives and forks?

1 = Chopsticks are easier for children to use.
2 = Chopsticks are more fun to use.
3 = Chopsticks are safer for young children.
4 = Chopsticks are traditional in China.

(45) One family bought a big box of a new dry cereal because it had a prize in the box, but no one liked the cereal. What should they do next time they want to try a new cereal?

1 = Buy a cereal that looks like one they have tried before.
2 = Buy a cereal they can cook.
3 = Buy a small box of the new cereal.
4 = Do not buy cereal with a prize in the box.

(46) Why is it especially important for children to get enough protein and minerals?

1 = They are growing rapidly.
2 = They have skin problems.
3 = They no longer take naps.
4 = They often get cavities in their teeth.

(47) Why are corn tortillas often eaten in Mexico?

1 = Corn tortillas are more nutritious than flour tortillas.
2 = It is easier to grind corn than wheat.
3 = Not many people are allergic to corn.
4 = There is more corn than wheat in Mexico.

SECTION IV

Directions: For each item in this section (Questions 48-54), mark the circle on your answer sheet that indicates what you really think about whether the change described should be made in the food service program at your school. Use the following scale:

1 =  *Yes*

2 =  *No*

(48) Do more different kinds of foods need to be served?

(49) Do children need to be given more choices (e.g., salad bar, different kinds of drinks, different kinds of desserts)?

(50) Does better tasting food need to be served?

(51) Do there need to be bigger servings on the plates?

(52) Do children need to help more with planning meals and ways of doing things?

(53) Does service need to be faster?

(54) Do food prices need to be lower?

SECTION V

Directions: Mark the special sections on your answer sheet to answer the items in this section about yourself.

Sex: Are you a male (boy) or a female (girl)?

Grade: What grade are you in now?

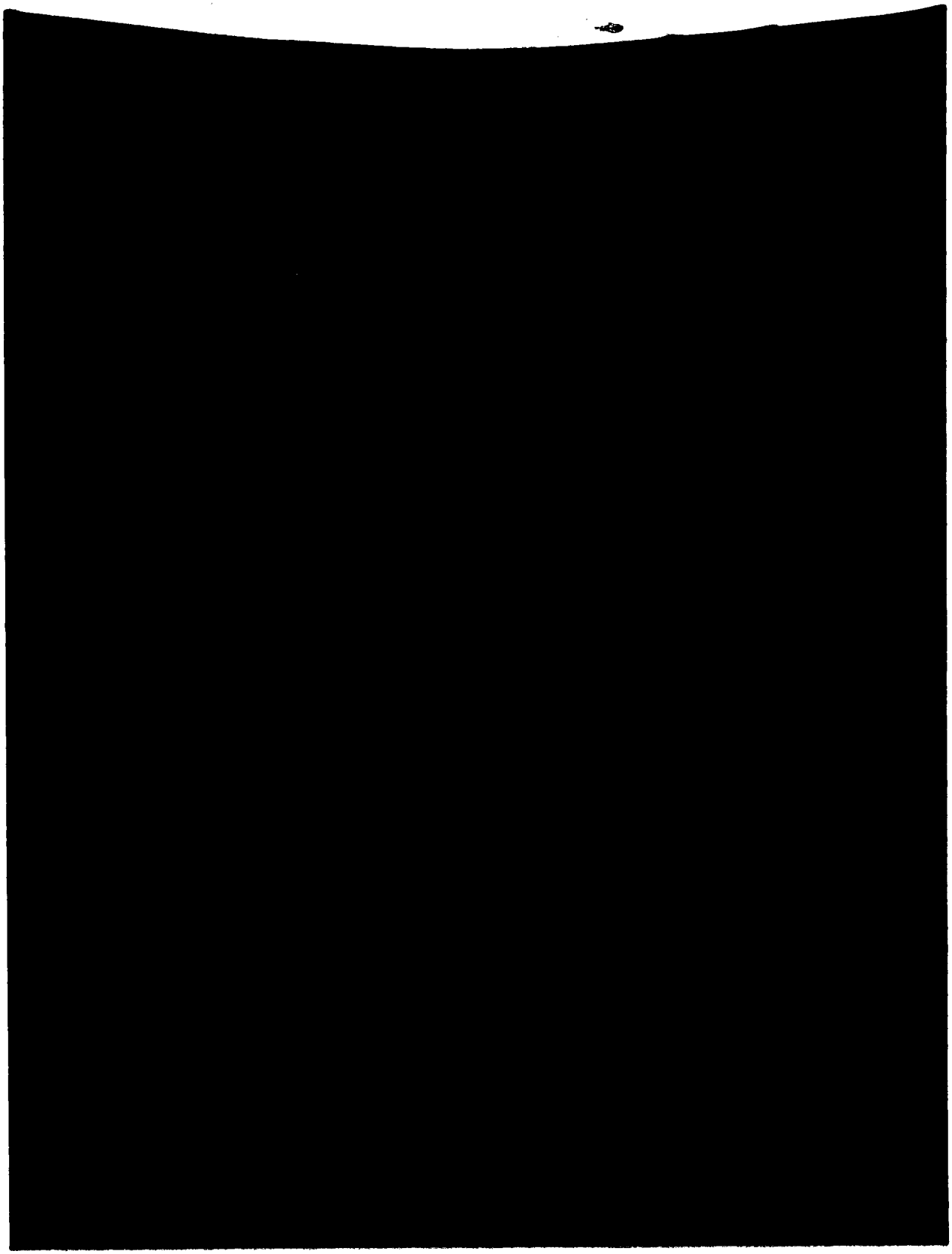


Figure 2. Teaming to Teach Nutrition Questionnaire

APPENDIX B

INSTRUMENT COVER LETTERS

THE UNIVERSITY OF TENNESSEE
College of Education · Bureau of Educational Research and Service
KNOXVILLE, TENNESSEE 37916

NUTRITION EDUCATION PROJECTS

HOME ECONOMICS BUILDING

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 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,

Trudy W. Banta

Trudy W. Banta
NET Evaluation Director

THE UNIVERSITY OF TENNESSEE
COLLEGE OF EDUCATION
KNOXVILLE, TENNESSEE 37916

BUREAU OF EDUCATIONAL RESEARCH AND SERVICE

May 10, 1982

Dear Teacher:

During the current school year, students in your classroom have taken or will take tests of nutrition knowledge, attitudes, and practices. As you know, these tests are a means of evaluating the status of nutrition education in the state as well as the effectiveness of nutrition curricula designed for grades K through 12 and recently implemented in several schools and school systems around the state.

One aspect of the new curriculum is an emphasis on the use of resource persons (e.g., food service personnel, media specialists, parents, students) in the implementation of nutrition education. The enclosed questionnaire is designed to measure the degree to which this type of "teaming" was used. Responses to this questionnaire from teachers across the state--including responses from teachers who have not yet had access to the new curriculum--will be analyzed with student responses on the tests of nutrition knowledge, attitudes, and practices in order to learn more about the use of teaming to teach.

All responses will be treated confidentially. Data will not be identified by teacher, school, or school system in reporting results. (However, it is important to place your name and school name on the completed questionnaire before returning it, so that your answers can be analyzed with those of your students.) No one will have access to the raw data except the researcher.

Your participation in this study is voluntary. You will not be penalized in any way if you decide not to return the questionnaire. You may withdraw from participation in the study at any time without any penalty to you. However, your help is very important in the effort to learn more about nutrition education and teaming to teach. This information in turn will be helpful to other teachers as they make decisions about teaching methods they will use in their classrooms. No risks to you as a participant are anticipated.

Completion of this questionnaire should take no more than 15 minutes of your time. Your completion and return of this questionnaire in the enclosed stamped self-addressed envelope will be considered evidence of your willingness to participate in the study.

If you have any questions about the study, please do not hesitate to contact me at (615) 974-5221, Dr. Jo Lynn Cunningham at (615) 974-5316, or Dr. Trudy W. Banta at (615) 974-4165. You also may write to me at the Bureau of Educational Research and Service, 2046 Terrace Avenue, The University of Tennessee, Knoxville, TN 37996-3504.

Thank you for your time and effort in completing this questionniare. Please return the completed questionnaire by May 24, 1982.

Sincerely,

Wilma Jozwiak

Wilma Jozwiak
Research Assistant
Bureau of Educational Research and Service
The University of Tennessee
Knoxville, Tennessee 37996-3504

APPENDIX C

MEANS, STANDARD DEVIATIONS, AND RANGES FOR INDIVIDUAL ITEMS ON THE TEAMING TO TEACH NUTRITION QUESTIONNAIRE

Table B-1

Means, Standard Deviations, and Ranges for Individual Items on the Teaming to Teach Nutrition Questionnaire

Item	Mean	Standard deviation	Range
Nutrition experts (n = 29)			
Developing goals/objectives	2.45	1.80	1-5
Providing background information	1.70	1.89	1-5
Planning an activity	2.90	1.86	1-5
Developing materials	3.00	1.81	1-5
Conducting an activity	3.00	1.85	1-5
Evaluating an activity/program	2.28	1.89	1-5
Other	1.38	1.57	1-5
Food service personnel (n = 38)			
Developing goals/objectives	2.13	1.26	1-5
Providing background information	2.66	1.17	1-5
Planning an activity	2.68	1.28	1-5
Developing materials	2.21	1.30	1-5
Conducting an activity	2.26	1.19	1-5
Evaluating an activity/program	1.97	1.50	1-4
Other	1.29	1.50	1-5
Other teachers (n = 33)			
Developing goals/objectives	3.21	1.24	1-5
Providing background information	2.82	.95	1-4
Planning an activity	3.27	1.10	1-5
Developing materials	3.00	1.25	1-5
Conducting an activity	2.91	1.23	1-5
Evaluating an activity/program	2.73	1.33	1-5
Other	1.30	.85	1-5
Building-level administrators (n = 18)			
Developing goals/objectives	2.44	1.20	1-5
Providing background information	2.39	1.09	1-4
Planning an activity	2.39	.92	1-4
Developing materials	2.22	.88	1-4
Conducting an activity	2.28	1.02	1-4
Evaluating an activity/program	2.61	1.04	1-4
Other	1.28	.83	1-4

Table B-1 (continued)

Item	Mean	Standard deviation	Range
System-level supervisors (n = 9)			
Developing goals/activities	2.89	1.27	1-5
Providing background information	3.00	1.32	1-5
Planning an activity	2.67	1.58	1-5
Developing materials	2.77	1.48	1-5
Conducting an activity	2.56	1.33	1-5
Evaluating an activity/program	2.56	1.33	1-5
Other	3.00	1.32	1-5
Media specialists or librarians (n = 37)			
Developing goals/objectives	1.95	1.50	1-5
Providing background information	3.24	1.04	1-5
Planning an activity	2.24	1.21	1-5
Developing materials	2.73	1.37	1-5
Conducting an activity	1.86	1.21	1-5
Evaluating an activity/program	1.57	1.12	1-5
Other	1.08	1.36	1-3
Other school support staff (n = 16)			
Developing goals/objectives	1.88	1.50	1-5
Providing background information	2.63	1.45	1-5
Planning an activity	2.50	1.32	1-5
Developing materials	2.25	1.29	1-5
Conducting an activity	2.56	1.41	1-5
Evaluating an activity/program	1.88	1.36	1-5
Other	1.44	1.36	1-5
Students (n = 60)			
Developing goals/objectives	3.08	1.51	1-5
Providing background information	2.90	1.45	1-5
Planning an activity	3.35	1.38	1-5
Developing materials	3.23	1.38	1-5
Conducting an activity	4.02	1.44	1-5
Evaluating an activity/program	3.75	1.60	1-5
Other	1.23	1.17	1-5

Table B-1 (Continued)

Item	Mean	Standard deviation	Range
Parents (n =34)			
Developing goals/objectives	1.62	.99	1-5
Providing background information	2.24	1.13	1-5
Planning an activity	2.32	1.61	1-5
Developing materials	2.26	1.33	1-5
Conducting an activity	2.35	1.18	1-5
Evaluating an activity/program	1.85	1.31	1-5
Other	1.00	0.00	1-1
Other community resource persons (n =11)			
Developing goals/objectives	2.18	1.60	1-5
Providing background information	3.18	1.08	1-4
Planning an activity	2.81	1.40	1-5
Developing materials	2.55	1.57	1-5
Conducting an activity	3.09	1.30	1-5
Evaluating an activity/program	2.36	1.75	1-5
Other	1.27	.90	1-4

Note. The n for each type of individual refers to the number of teachers who indicated having involved that type of individual in teaming to teach. Potential score ranges for items was 1 ("never") to 5 ("always").

VITA

Wilma Wohlwend Jozwiak was born in Knoxville, Tennessee, on April 11, 1947. She attended school in Knoxville, graduating from Fulton High School in June of 1965. She married John Stephen Jozwiak on March 22, 1969. Their daughter, Mariesa, was born on April 20, 1971.

Wilma received the Bachelor of Science degree in special education from The University of Tennessee, Knoxville, in December of 1973. She began teaching with the Knox County School System in January of 1974 and at the same time began work toward a master's degree. The Master of Science in special education was awarded from The University of Tennessee, Knoxville, in August of 1975.

In the fall of 1977, Wilma entered the Interdisciplinary Doctoral Program in the College of Home Economics of The University of Tennessee, Knoxville. During her doctoral study, she held a graduate assistantship, a graduate assistantship in administration, and research assistantships. She was awarded University of Tennessee Alumni Fellowships, the Hilton E. Smith Graduate Fellowship, and the Sadie Katherine Stanton Fellowship. She also was chosen to participate as a Fellow in a National Institute of Education program for the advancement of women and minorities in educational research.

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 included child development, interior design and housing, and educational psychology.